

AD-A077 910

NEW YORK STATE DEPT OF ENVIRONMENTAL CONSERVATION ALBANY F/G 13/13  
NATIONAL DAM SAFETY PROGRAM. SUSQUEHANNA RIVER BASIN, INVENTORY--ETC(U)  
FEB 79 G KOCH

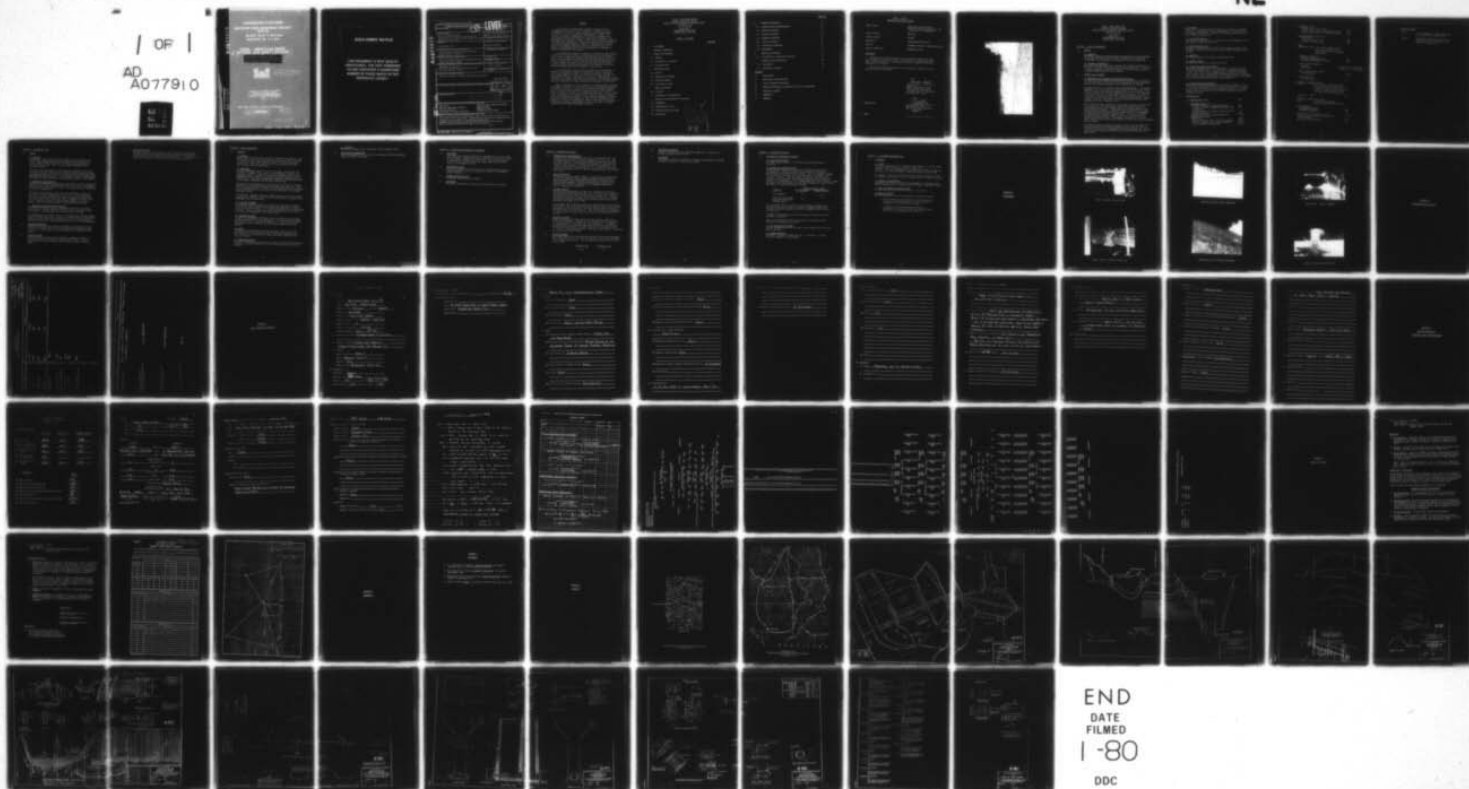
UNCLASSIFIED

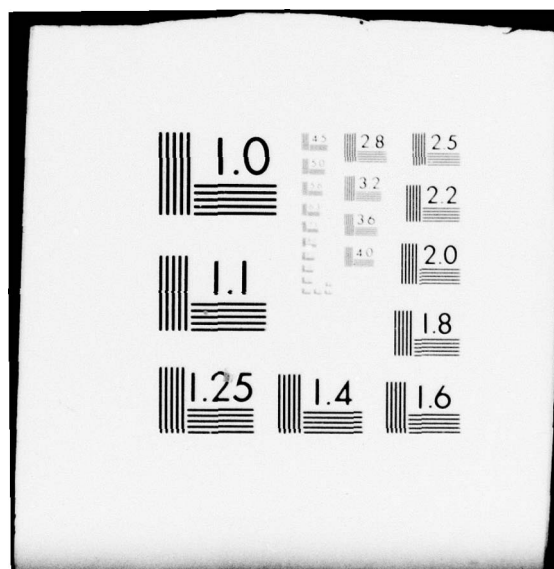
DACW51-79-C-0001

NL

/ OF |

AD  
A077910





Susquehanna River Basin, Inventory  
Number NY-575. Nanticoke Creek Watershed  
Project Site 9E. Broome County, New York.  
Phase I Inspection Report.



10 George

## **DISCLAIMER NOTICE**

**THIS DOCUMENT IS BEST QUALITY  
PRACTICABLE. THE COPY FURNISHED  
TO DDC CONTAINED A SIGNIFICANT  
NUMBER OF PAGES WHICH DO NOT  
REPRODUCE LEGIBLY.**



SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

**LEVEL**

REPORT DOCUMENTATION PAGE

1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. REPORT NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report Nanticoke Creek Watershed Project Site 9E Susquehanna River Basin, Broome County, New York Inventory No. N.Y. 575		5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program
7. AUTHOR(s)  George Koch, P.E.	6. PERFORMING ORG. REPORT NUMBER  DACW-51-79-C-0001	
9. PERFORMING ORGANIZATION NAME AND ADDRESS New York State Department of Environmental Conservation/ 50 Wolf Road Albany, New York 12233		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS New York State Department of Environmental Con- servation/ 50 Wolf Road Albany, New York 12233		12. REPORT DATE 17 April 1979
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Department of the Army 26 Federal Plaza/ New York District, CofE New York, New York 10007		13. NUMBER OF PAGES
		15. SECURITY CLASS. (of this report)  UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  Approved for public release; Distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
19. SUPPLEMENTARY NOTES  THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DDC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT		
20. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dam Safety National Dam Safety Program Visual Inspection Hydrology, Structural Stability Nanticoke Creek Watershed Project Broome County Ninticoke Creek Susquehanna River Basin		
21. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization. Nanticoke Creek Watershed Protection Project Dam Site 9E was found to have no conditions which would render the dam unsafe.		

DDC  
RECEIVED  
OCT 5 1979  
E

ADA077910

DDC FILE COPY

## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probably Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE 1 INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
NANTICOKE CREEK WATERSHED PROTECTION PROJECT  
DAM SITE No. 9E  
I.D. No. NY 575  
(#85D-3646)  
SUSQUEHANNA RIVER BASIN  
BROOME COUNTY, NEW YORK

TABLE OF CONTENTS

	<u>PAGE NO.</u>
- ASSESSMENT	
- OVERVIEW PHOTOGRAPH	
1 PROJECT INFORMATION	1
1.1 GENERAL	1
1.2 DESCRIPTION OF PROJECT	1
1.3 PERTINENT DATA	2
2 ENGINEERING DATA	5
2.1 DESIGN	5
2.2 CONSTRUCTION RECORDS	5
2.3 OPERATION RECORD	5
2.4 EVALUATION OF DATA	6
3 VISUAL INSPECTION	7
3.1 FINDINGS	7
3.2 EVALUATION OF OBSERVATIONS	8
4 OPERATION AND MAINTENANCE PROCEDURES	9
4.1 PROCEDURE	9
4.2 MAINTENANCE OF DAM	9
4.3 WARNING SYSTEM IN EFFECT	9
4.4 EVALUATION	9

Accession For	
NTIS Grant	<input checked="" type="checkbox"/>
DOC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	<input type="checkbox"/>
By _____	
Distribution/	
Availability Codes	
Avail and/or	Special
<div style="font-size: 2em; font-family: cursive;">A 23</div> <div style="font-size: 1.5em; font-family: cursive;">CP</div>	



	<u>PAGE NO.</u>
5 HYDROLOGIC/HYDRAULIC	10
5.1 DRAINAGE AREA CHARACTERISTICS	10
5.2 ANALYSIS CRITERIA	10
5.3 SPILLWAY CAPACITY	10
5.4 RESERVOIR CAPACITY	10
5.5 FLOODS OF RECORD	10
5.6 OVERTOPPING POTENTIAL	11
5.7 EVALUATION	11
6 STRUCTURAL STABILITY	12
6.1 EVALUATION OF STRUCTURAL STABILITY	12
7 ASSESSMENT/RECOMMENDATIONS	13
7.1 ASSESSMENT	13
7.2 RECOMMENDED MEASURES	13

#### APPENDIX

A.	PHOTOGRAPHS
B.	ENGINEERING DATA CHECKLIST
C.	VISUAL INSPECTION CHECKLIST
D.	HYDROLOGIC/HYDRAULIC ENGINEERING DATA AND COMPUTATIONS
E.	STABILITY ANALYSES
F.	REFERENCES
G.	DRAWINGS

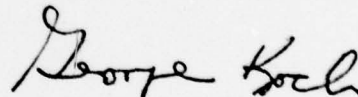
**PHASE 1 REPORT**  
**NATIONAL DAM SAFETY PROGRAM**

Name of Dam:	Nanticoke Creek Watershed Protection Project Dam Site No. 9E I.D. No. NY 575 (#85D-3646)
State Located:	New York
County Located:	Broome
Watershed:	Susquehanna River Basin
Stream:	Unnamed tributary of Nanticoke Creek
Date of Inspection:	November 8, 1978

**ASSESSMENT**

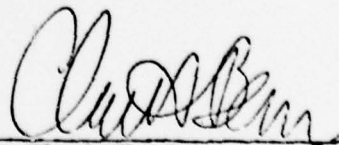
The Nanticoke Creek Watershed Protection Project, Dam Site No. 9E, is a floodwater retarding structure. Examination of available documents and a visual inspection of the dam did not reveal conditions which are considered to be unsafe.

The total discharge capability of the spillway is adequate for the Probable Maximum Flood (PMF).



George Koch  
Chief, Dam Safety Section  
New York State Department  
of Environmental Conservation  
NY License No. 45937

Approved By:



Col. Clark H. Benn  
New York District Engineer

17 Dec 77

Date:

\_\_\_\_\_



NANTICOKE CREEK SITE No. 9E  
OVERVIEW

PHASE 1 INSPECTION REPORT  
NATIONAL DAM SAFETY PROGRAM  
NANTICOKE CREEK WATERSHED PROTECTION PROJECT  
DAM SITE No. 9E  
I.D. No. NY 575  
(#85D-3646)  
SUSQUEHANNA RIVER BASIN  
BROOME COUNTY, NEW YORK

SECTION 1: PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase 1 Inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers, to fulfill the requirements of the National Dam Inspection Act, Public Law 92-367.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing conditions of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

a. Description of the Dam and Appurtenant Structures

The Nanticoke Creek Watershed Protection Project Dam No. 9E consists of an earth dam with a principal spillway pipe passing through the embankment and two emergency spillways on the southern end of the dam.

The dam consists of two compacted earth, zoned embankments. The northern embankment is 42 feet high, has a crest length of 520 feet and a crest width of 15 feet. The southern embankment section is 15 feet high, has a crest length of 295 feet and a crest width of 15 feet. The upstream slopes are 1 vertical on 3 horizontal and the downstream slopes are 1 vertical on 2 1/2 horizontal. The crest and exposed slopes are grass covered. An earth cutoff trench of varying depth and width keys both embankments into the foundation soils.

The principal spillway consists of a two stage reinforced concrete drop inlet structure, a 36 inch diameter reinforced concrete pipe with anti-seepage collars, and an impact basin to dissipate energy at the outlet end of the conduit. A reservoir drain consisting of a 12 inch corrugated metal pipe extends from the upstream toe of the embankment to the base of the principal spillway riser. A vertical slide gate mechanism mounted along the inside of the riser controls the flow through the reservoir drain. The emergency spillways are two grass lined channels each 150 feet wide, located in earth cuts on the southeastern end of the dam.

An internal drainage system consisting of a gravel and sand drain fill with perforated 8 inch diameter corrugated metal collector pipes is located at the base of the embankment near the downstream toe. Seepage is collected and conducted through this drain and outleted into the impact basin.



b. Location

Dam No. 9E of the Nanticoke Creek Project is located on an unnamed tributary of the Nanticoke Creek, approximately 1.5 miles north of the Village of Nanticoke. The site is off Cadwell Hill Road in the Town of Nanticoke, New York.

c. Size Classification

This dam is 42 feet high and is classified as an "intermediate" size dam (between 40 and 100 feet high).

d. Hazard Classification

The dam is classified in the "high" hazard category because of the presence of several homes and the Village of Nanticoke downstream of the dam.

e. Ownership

This dam is owned by the County of Broome, New York.

f. Purpose of Dam

This dam is a floodwater retarding structure.

g. Design and Construction History

This dam was designed by the U.S. Department of Agriculture, Soil Conservation Service (SCS). Construction of the dam was completed in 1967. The SCS Office for Broome County, located at the Broome County Airport, has a design folder containing hydrologic, hydraulic, and structural design information, and the as-built plans and documents. These as-built plans were included in the Appendix G.

h. Normal Operating Procedures

Normal flows are discharged through the principle spillway. This structure has sufficient capacity to store and discharge a 100 year flood without flow occurring in the emergency spillway. For storms greater than the 100 year flood, flow will discharge through the emergency spillway.

1.3

PERTINENT DATA

a. <u>Drainage Area</u> (acres)	1827
b. <u>Discharge at Dam</u> (cfs)	
Principle Spillway at Maximum High Water	165
Principle Spillway at Emergency Spillway Crest	156
Elevation	
Reservoir Drain at Principle Spillway Crest El.	14
Maximum Known Flood	152
Emergency Spillway at Maximum High Water	11754
c. <u>Elevation</u> (USGS datum)	
Top of Dam	1191.8
Emergency Spillway Crest (Auziliary Spillway)	1186.7
Principle Spillway Crest (Service Spillway)	1176.7
Invert of Reservoir Drain Inlet	1153.0



d.	<u>Reservoir (acres)</u>	
	Surface area at Top of Dam	41.0
	Surface area at Crest of Emergency Spillway	32.2
	Surface area at Crest of Principle Spillway	16.2
e.	<u>Storage Capacity (acre-feet)</u>	
	Top of Dam	538
	Emergency Spillway Crest	353
	Principle Spillway Crest	120
f.	<u>Dam</u>	
	Embankment Type: A two zoned compacted earth fill in two sections with an earth keyed cutoff trench under each section	
	Embankment Length (ft.)	
	Northern Embankment Section	520
	Southeastern Embankment Section	295
	Slopes: Both Embankments	
	Upstream	1 vertical on 3 horizontal
	Downstream	1 vertical on 2.5 horizontal
	Crest Elevation (USGS datum)	
	Both Embankments	1191.8
	Crest Width (ft.)	
	Both Embankments	15
g.	<u>Principal Spillway (Service)</u>	
	Type: Uncontrolled, reinforced concrete two stage drop inlet (3x9 ft.) rising 26.2 feet; 36 inch reinforced concrete pressure conduit 207.58 feet long; concrete impact basin	
	Length (ft.) Weir	18
	Emergency Spillway (Auxiliary)	
	Type: Two grass-lined channels having trapezoidal cross sections.	
	Bottom Width(ft.)	
	Northwestern Channel	150
	Southeastern Channel	150
	Side Slopes: Both Channels (V : H)	1 on 3
	Length of level section (in profile) (ft.)	
	Both Channels	30
	Exit Slope: Both Channels	.028

h. Reservoir Drain

Type: 12 inch diameter corrugated metal pipe  
with a reinforced concrete inlet.

Control: Mechanically operated vertical slide  
gate mounted along the inside of the  
principal spillway riser.

## SECTION 2: ENGINEERING DATA

### 2.1 DESIGN

#### a. Geology

The Nanticoke Creek Watershed Project Dam No. 9E is located in the "Glaciated Allegheny Plateau" physiographic province of New York State. Bedrock underlying the site is mapped as Cashaqua Shale of the Upper Devonian Age. This rock was formed approximately 400 million years ago.

Glacial ice was instrumental in smoothing the topography of the area. The present surficial deposits have resulted primarily from glaciations during the Cenozoic Era, the last of which was the Wisconsin glaciation, approximately 11,000 years ago. Glacial deposits such as outwash plains and eskers are major features of the landscape in parts of this region.

#### b. Subsurface Investigations

A subsurface investigation program was conducted by the Soil Conservation Service in 1965. This program consisted of 17 test pits. The maximum depth of the explorations was 12 feet. Applicable subsurface information is included in Appendix G.

In general, the subsurface conditions on both abutments consist of a thin layer of topsoil underlain by glacial till. In the floodplain, the topsoil layer is underlain by a layer of relatively clean gravel, four to six feet thick. The glacial till is beneath this layer. The cutoff trench was designed to impede seepage through this layer of gravel. Bedrock was not encountered in the exploration program.

#### c. Embankment and Appurtenant Structures

The dam was designed by the Soil Conservation Service who prepared a design report. Fifteen drawings, several of which have been included in Appendix G, were prepared for the construction of the dam.

The embankment has two zones. Zone 1 is a longitudinal drainage blanket under the downstream slope of the dam, constructed using the clean gravel removed from the cutoff trench excavation. Zone 2 is the relatively impervious glacial till which forms the major portion of both embankments.

### 2.2 CONSTRUCTION RECORDS

Complete as-built contract plans and documents are available from the SCS Office in Broome County. No major construction changes were made on this job. The as-built plans are included in the Appendix of this report.

### 2.3 OPERATION RECORD

Since the dam is an uncontrolled, floodwater retarding structure, no operating records are maintained regarding water levels. However, during periods of heavy rainfall, SCS personnel do monitor reservoir levels.

2.4

EVALUATION OF DATA

The data presented in this report has been compiled from information obtained from the Soil Conservation Service as well as the New York State Department of Environmental Conservation files. It appears to be adequate and reliable for the purpose of the Phase 1 Inspection.



## SECTION 3: VISUAL INSPECTION

### 3.1 FINDINGS

#### a. General

Visual inspection of Dam Site No. 9E was conducted on November 8, 1978. The weather was clear the the temperature was around 50°F. The water surface was several inches above the invert of the low stage inlet on the riser. There was a small flow from the principal spillway pipe spilling into the impact basin.

#### b. Embankment

The earth embankment showed no signs of distress. The vertical and horizontal alignment of the crest of both embankments appeared to be satisfactory, with no visible surface cracks appearing on the crest or embankment slopes. There were no areas of serious sloughing or subsidence noted. Some minor sloughing was observed on the upstream slope in the range of fluctuation of the water surface level.

Inspection of the downstream face did not reveal any signs of seepage. The collection pipes from the internal drainage system were dry. There were rock lined trenches to collect surface runoff along the intersection of the downstream toe of the slope with each abutment on the northern embankment section.

No undesirable vegetative growth of animal penetrations into the slopes were observed. However, on the date of the inspection, the grass on the embankments had not been mowed.

#### c. Principal Spillway

The principal spillway consists of the vertical drop inlet structure, a reinforced concrete pressure pipe through the embankment, an impact basin and an outlet channel. All of these components were in satisfactory condition. There was a small gap around the principal spillway pipe at its joint with the headwall of the impact basin.

#### d. Emergency Spillway

Two grass lined emergency spillways in earth cut sections are located beyond the southern end of the embankment. The spillway had been mowed and appeared to be in satisfactory condition. A small portion had not been mowed because of several logs which had been deposited in the channel.

#### e. Drain

The reservoir drain conduit and slide gate may be used to lower the reservoir when the pool level is below the principal spillway crest. The slide gate is located within a pipe sleeve which extends to the top of the riser.

#### f. Downstream Channel

The outlet channel beyond the end of the impact basin was in satisfactory condition. No severe side-slope erosion or debris obstructions were in evidence.

g. Reservoir

There were no signs of soil instability in the reservoir area.

3.2

EVALUATION OF OBSERVATIONS

Visual observations did not reveal any problems which would adversely affect the safety of the dam.

#### SECTION 4: OPERATION AND MAINTENANCE PROCEDURES

##### 4.1 PROCEDURES

The normal water surface elevation is approximately at the low stage inlet elevation. Downstream flows are limited by the capacity of the 36 inch diameter reinforced concrete pipe. The reservoir provides 328 acre feet of storage between the normal water level and the crest of the emergency spillway.

##### 4.2 MAINTENANCE OF DAM

The dam is maintained by the owner and is in satisfactory condition. Normal maintenance consists of mowing the bottom of the emergency spillway channels.

##### 4.3 WARNING SYSTEM IN EFFECT

No apparent warning system is present

##### 4.4 EVALUATION

The dam and appurtenant structures are satisfactorily maintained.

## SECTION 5: HYDROLOGIC/HYDRAULIC

### 5.1 DRAINAGE AREA CHARACTERISTICS

Delineation of the watershed draining into the reservoir pool area was made using the USGS 7.5 minute quadrangle for Lisle, N.Y. The watershed consists of woodlands and lightly forested area situated in a rural section. Relief ranges from moderate to steep with the steeper slopes occurring on the western side of the watershed. The slopes on the western side range from 10 to 15%, and on the eastern side they range from 5 to 10%. The oval shaped drainage area is about 1827 acres.

### 5.2 ANALYSIS CRITERIA

The analysis of the spillway capacity of the dam was performed using the Corps of Engineer's HEC-1 computer program, incorporating the "Snyder Synthetic Unit Hydrograph" method and the "Modified Puls" flood routing procedure. The spillway design flood selected for analysis was the PMF in accordance with recommended guidelines of the U.S. Army Corps of Engineers.

### 5.3 SPILLWAY CAPACITY

The principal and emergency spillways are uncontrolled structures. The principal spillway operates under weir or orifice flow conditions depending upon the floodwater inflow to the reservoir pool. During orifice flow operation, pressure flow develops in the 36 inch conduit. The emergency spillway was analyzed as a broad-crested weir having a discharge coefficient (C) of 3.087.

The spillways have sufficient capacity for discharging the peak outflow from the PMF. Due to the limited storage capacity, there will be little attenuation of the storm flows. For this storm, the peak inflow and the peak outflow, are both 4905 cfs. When the spillways are discharging the peak outflow, the water surface will be 2.2 feet below the top of the dam.

### 5.4 RESERVOIR CAPACITY

Normal flood control storage capacity of the reservoir between the principal and emergency spillways is 233 acre-feet which is equivalent to a runoff depth of 1.5 inches over the drainage area. Surge storage capacity to the maximum high water elevation is an additional 185 acre-feet; equivalent to a runoff depth over the drainage area of 1.2 inches. Total storage capacity of the dam is 538 acre-feet; equivalent to 3.5 inches of direct runoff.

### 5.5 FLOODS OF RECORD

The maximum known flood occurred during Hurricane Eloise during September, 1975. The pool level at this time was reported to be about 8' feet above the principal spillway crest. The calculated discharge for this flood is as follows:

<u>Elevation (ft)</u>	<u>Discharge (cfs)</u>
1184.7	152



5.6 OVERTOPPING POTENTIAL

Analysis indicates the total discharge capability is sufficient to prevent overtopping from the PMF.

5.7 EVALUATION

This dam has sufficient capability to impound and adequately discharge floodwaters expected to result from the PMF.

## SECTION 6: STRUCTURAL STABILITY

### 6.1 EVALUATION OF STRUCTURAL STABILITY

#### a. Visual Observations

No signs of major distress of the dam were observed during the inspection.

#### b. Design and Construction Data

Design data was obtained from the Soil Conservation Service Office in Binghamton. Stability analyses were performed by SCS using a modification of the Swedish Circle Method. The soil parameters assumed for the stability analyses were a friction angle of 31 degrees and a cohesion of 500 pcf. These parameters appear to be appropriate for the type of soil involved. The stability analyses were performed assuming 1 on 3 upstream and 1 on 2.5 downstream slopes with no berms (a berm was used in the final design, but this would increase the safety factor). The results of the analyses are as follows:

<u>CONDITION</u>	<u>MINIMUM FACTOR OF SAFETY</u>	
	<u>UPSTREAM SLOPE</u>	<u>DOWNSTREAM SLOPE</u>
Full Drawdown	2.3	_____
Long Term Steady State Seepage from Emergency Spillway Crest	_____	2.2

The calculated factors of safety for this dam are in excess of the minimum factors in the Corps of Engineers recommended guidelines. The dam is therefore considered to have an adequate factor of safety for stability.

A summary of the analyses and sections showing the failure arcs are included in Appendix E.

Based on discussions with SCS representatives, the dam was built essentially according to the plans.

#### c. Post Construction Changes

The SCS representatives were not aware of any changes which have been made on the dam.

#### d. Seismic Stability

This dam is located in Seismic Zone No. 1. Therefore, a seismic stability analysis is not warranted.

## SECTION 7: ASSESSMENT/RECOMMENDATIONS

### 7.1 ASSESSMENT

#### a. Safety

The Phase 1 Inspection of the Nanticoke Creek Dam No. 9E did not reveal conditions which constitute a hazard to human life or property. The earth embankment is considered to be stable structurally, and capable of safely retarding floodwaters resulting from the PMF.

The design of this dam includes an internal drainage system to control the phreatic surface and to provide a safe outlet for foundation seepage.

#### b. Adequacy of Information

Information concerning the design and performance of this dam is considered adequate for the purpose required for Phase 1 Inspection Reports.

#### c. Need for Additional Investigations

No additional investigations are necessary at this time.

### 7.2 RECOMMENDED MEASURES

The following tasks should be undertaken by maintenance forces:

- a. Periodic operation and lubrication of the mechanically operated slide gate mechanism to insure the ease of operation of the reservoir drain conduit.
- b. A schedule for periodic maintenance should be established which would include items such as mowing the grass on the embankment slopes and crest.

APPENDIX A

PHOTOGRAPHS



RISER - PRINCIPAL SPILLWAY INLET



RISER - NOTE LOG LODGED IN TRASH RACK





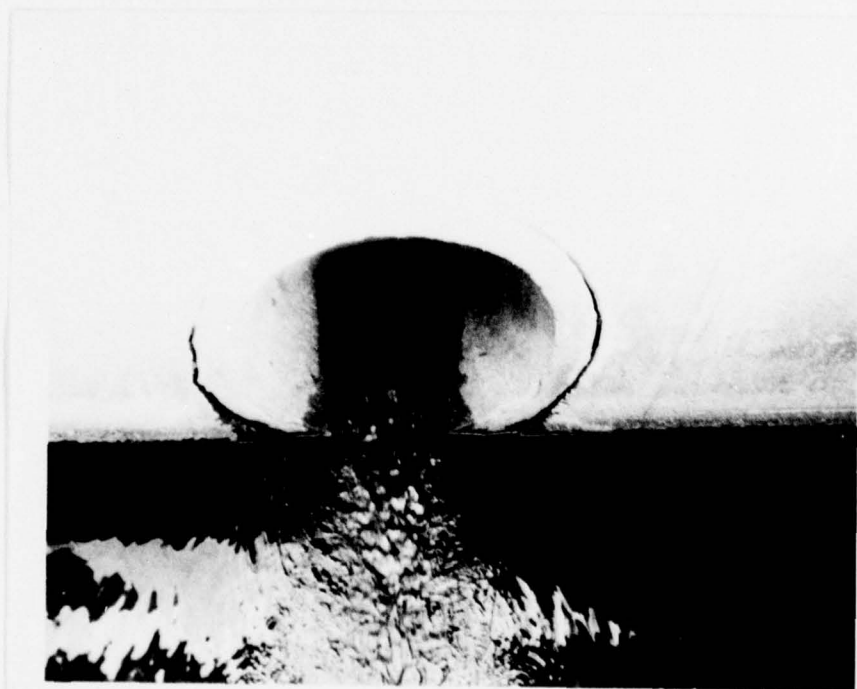
EMERGENCY SPILLWAY LOOKING DOWNSTREAM



DOWNSTREAM SLOPE OF NORTHERN EMBANKMENT



IMPACT BASIN - LOOKING UPSTREAM



OUTLET TO PRINCIPAL SPILLWAY PIPE

APPENDIX B

ENGINEERING DATA CHECKLIST



Name of Dam SITE 9E  
 I.D. # N.Y. 575  
(85D-3646)

Check List  
 Engineering Data  
 Design Construction Operation

Item	Remarks		
	Plans	Details	Typical Sections
Dam	YES	YES	YES
Spillway(s)	YES	YES	YES
Outlet(s)	YES	YES	YES
Design Reports	YES		
Design Computations	YES		
Discharge Rating Curves	YES		
Dam Stability	YES		
Seepage Studies	YES		
Subsurface and Materials Investigations	YES		

Item	Remarks
Construction History	ONLY INFORMATION AVAILABLE OBTAINED THROUGH DISCUSSIONS WITH PROJECT INSPECTOR
Surveys, Modifications, Post-Construction Engineering Studies and Reports	NONE REPORTED
Accidents or Failure of Dam Description, Reports	NONE REPORTED
Operation and Maintenance Records Operation Manual	NONE

APPENDIX C

VISUAL INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam NANTICOKE CREEK SITE 9E

I.D. # N.Y. 575 (#85D-3446)

Location: Town NANTICOKE County BROOME

Stream Name UNNAMED

Tributary of NANTICOKE CREEK

Longitude (W), Latitude (N) W76°3.1' N42°17.5'

Hazard Category C

Date(s) of Inspection 11/8/78

Weather Conditions SUNNY 45°-50°

b. Inspection Personnel R. WARRENDER; W. LYNICK

c. Persons Contacted H. HIRTH, SCS SYRACUSE

G. PAGE & D. KOLESAR, SCS BROOME Co.

d. History:

Date Constructed 1966-67

Owner BROOME COUNTY

Designer SCS

Constructed by Mc DOUGALL CONST. Co.

2) Technical Data

Type of Dam EARTH

Drainage Area 1827 ~~1582~~ ACRES

Height 42 Length NORTH SECTION 520'  
SOUTH 295'

Upstream Slope 1 ON 3 Downstream Slope 1 ON 2.5

2) Technical Data (Cont'd.)

External Drains: on Downstream Face \_\_\_\_\_ @ Downstream Toe RIP RAP

Internal Components:

- Impervious Core \_\_\_\_\_

Drains 8" CMP DRAIN PIPE IN SAND & GRAVEL DRAIN

Cutoff Type COMPACTED EARTH FILL

Grout Curtain \_\_\_\_\_



3) Embankment

EARTH FILL WITH GOOD VEGETATIVE COVER

a. Crest

(1) Vertical Alignment OKAY

(2) Horizontal Alignment OKAY

(3) Surface Cracks NONE

(4) Miscellaneous CREST HAD NOT BEEN MOWED

b. Slopes

(1) Undesirable Growth or Debris, Animal Burrows SLOPES HAD  
NOT BEEN MOWED

(2) Sloughing, Subsidence or Depressions MINOR SLOUGHING ON  
UPSTREAM SLOPE AT WATER SURFACE ELEVATION

(3) Slope Protection UNMOWED GRASS

(4) Surface Cracks or Movement at Toe NONE

(5) Seepage NONE

(6) Condition Around Outlet Structure SATISFACTORY

c. Abutments

(1) Erosion at Embankment and Abutment Contact NONE

(2) Seepage along Contact of Embankment and Abutment NONE

(3) Seepage at toe or along downstream face NONE

d. Downstream Area - below embankment

FARM FIELDS

(1) Subsidence, Depressions, etc. NONE

(2) Seepage, unusual growth NONE

(3) Evidence of surface movement beyond embankment toe NO EVIDENCE

(4) Miscellaneous

e. Drainage System

2 - 8" D.I.A. CMP IN SAND & GRAVEL DRAIN FILL

(1) Condition of relief wells, drains, etc. \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(2) Discharge from Drainage System NO DISCHARGE

\_\_\_\_\_  
\_\_\_\_\_



4) Instrumentation

(1) Monumentation/Surveys N/A

(2) Observation Wells N/A

(3) Weirs N/A

(4) Piezometers N/A

(5) Other

5) Reservoir

a. Slopes FORESTED UP TO WATER'S EDGE

b. Sedimentation

a) Spillway(s) (including tail race channel)

a. General RISER, OUTLET PIPE & IMPACT BASIN IN  
SATISFACTORY CONDITION

b. Principle Spillway 26.2' HIGH RECTANGULAR RC DROP INLET;  
36" DIA RC PRESSURE PIPE ; CONCRETE IMPACT  
BASIN - A 10" DIA. LOG WAS LODGED IN THE RISER'S TRASH RACK.  
ALL IN SATISFACTORY CONDITION - VERY SLIGHT SEPARATION  
AROUND RC PIPE AT JUNCTION WITH IMPACT BASIN  
HEADWALL -

c. Emergency or Auxiliary Spillway TWO GRASS LINED TRAPEZOIDAL  
OPEN CHANNELS IN EARTH CUT.  
BOTTOM OF CHANNELS MOWED - ONE SECTION NOT  
MOWED BECAUSE OF A LOG LYING IN THE CHANNEL.

d. Condition of <sup>OUTLET</sup>~~tail race~~ channel SATISFACTORY

e. Stability of Channel side/slopes SATISFACTORY

7) Downstream Channel

a. Condition (debris, etc.) NORMAL GROWTH - TREE LINED  
- ABOVE STREAM BANKS

b. Slopes SATISFACTORY - OUTLET INTO WIDE FARM FIELD

c. Approximate number of homes ABOUT 12-15 IN THE VILLAGE  
OF NANTICOK PLUS A CHURCH W/ MEETING  
HOUSE,

8) Miscellaneous

9) Structural

a. Concrete Surfaces SATISFACTORY

b. Structural Cracking NONE

c. Movement - Horizontal & Vertical Alignment (Settlement) NONE

d. Junctions with Abutments or Embankments N/A

e. Drains - Foundation, Joint, Face N/A

f. ~~Water passages~~, conduits, sluices SATISFACTORY

g. Seepage or Leakage NONE



h. Joints - Construction, etc. SOME MORTAR WAS MISSING  
AT IMPACT BASIN - CONDUIT GASKET

i. Foundation

j. Abutments

k. Control Gates RESERVOIR DRAIN HAS SLIDE GATE

l. Approach & Outlet Channels

m. Energy Dissipators (~~plunge pool~~, etc.) IMPACT BASIN - OKAY

n. Intake Structures

o. Stability

p. Miscellaneous



APPENDIX D

HYDROLOGIC/HYDRAULIC

ENGINEERING DATA AND COMPUTATIONS

CHECK LIST FOR DAMS  
HYDROLOGIC AND HYDRAULIC  
ENGINEERING DATA

1

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam	<u>1191.8</u>	<u>41.0</u>	<u>538</u>
2) Design High Water (Max. Design Pool)	<u>1189.4</u>	<u>37.0</u>	<u>446</u>
3) Auxiliary Spillway Crest	<u>1186.7</u>	<u>32.2</u>	<u>353</u>
4) Pool Level with Flashboards	<u>N/A</u>	<u></u>	<u></u>
5) Service Spillway Crest	<u>1176.7</u>	<u>16.2</u>	<u>120</u>

DISCHARGES

	<u>Volume</u> (cfs)
1) Average Daily	<u>N/A</u>
2) Spillway @ Maximum High Water	<u>165</u>
3) Spillway @ Design High Water	<u>161</u>
4) Spillway @ Auxiliary Spillway Crest Elevation	<u>156</u>
5) Low Level Outlet	<u>14</u>
6) Total (of all facilities) @ Maximum High Water	<u>11920</u>
7) Maximum Known Flood	<u>152</u>

CREST:

ELEVATION: 1191.8Type: LEVEL; GRASSED EARTHWidth: 15Length: NORTH SECTION 520  
SOUTH 295Spillover N/A

Location \_\_\_\_\_

SPILLWAY:

PRINCIPAL

EMERGENCY

1176.7Elevation 1186.7RC DROP INLET W/ TRASH RACKType 2 TRAPEZOIDAL CHANNELS3'x9'Width EACH 150' WITH 1 ON 3 SLOPES

Type of Control

✓

Uncontrolled

✓

Controlled:

N/A

Type

N/A

(Flashboards; gate)

N/A

Number

N/AN/A

Size/Length

N/AInvert Material MOWED GRASSAnticipated Length  
of operating service< 1 PER 100 YRS36" DIA RC 208 ftChannel Length NORTH 450' SOUTH 750'SHARP CRESTEDHeight Between Spillway Crest  
& Approach Channel Invert  
(Weir Flow)N/AL/b = 1.0BROAD CRESTED WEIRWEIR LENGTH = 12'

~~OUTLET STRUCTURES/EMERGENCY DRAWDOWN FACILITIES:-~~ RESERVOIR DRAINType: Gate ✓ Sluice \_\_\_\_\_ Conduit ✓ Penstock \_\_\_\_\_Shape: GATE - FLAT CIRCULAR CONDUIT - ROUND CAST IRON

Size: \_\_\_\_\_

Elevations: Entrance Invert 1153.0Exit Invert 1144.5Tailrace Channel: Elevation 1144.5

## HYDROMETEROLOGICAL GAGES:

Type: NONE

Location: \_\_\_\_\_

Records:

Date - \_\_\_\_\_

Max. Reading - \_\_\_\_\_

## FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

Method of Controlled Releases (mechanisms):

NONE EXCEPT FOR MANUALLY OPERATED RESERVOIR  
DRAIN SLIDE GATE

DRAINAGE AREA: 1827 ACRES 2.86 SQ MI

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: FOREST

Terrain - Relief: MODERATE - STEEP

Surface - Soil: GLACIAL TILL

Runoff Potential (existing or planned extensive alterations to existing  
(surface or subsurface conditions)

NONE

Potential Sedimentation problem areas (natural or man-made; present or future)

NONE

Potential Backwater problem areas for levels at maximum storage capacity  
including surcharge storage:

NONE

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the  
Reservoir perimeter:

Location: NONE

Elevation: \_\_\_\_\_

Reservoir:

Length @ Maximum Pool N/A (Miles)

Length of Shoreline (@ Spillway Crest) N/A (Miles)



NANTICOKE

DAM SITE #9E

D.A. = Drainage area in square miles

L = River mileage from the given station to the upstream limits of the drainage area

LCA = River mileage from the station to the center of gravity of the drainage area

PMP = Probable Maximum Precipitation in inches

$t_p$  = Lag time from mid-point of unit rainfall duration,  $t_r$ , to peak of unit hydrograph, in hours.

$t_r$  = Unit rainfall duration, equal to  $\frac{t_p}{5.5}$ , in hours.

$C_t$  = Coefficient depending upon units and drainage basin characteristics

$t_R$  = Unit rainfall duration other than standard unit;  $t_r$  adopted in specific study, in hours.

$t_{PR}$  = Lag time from mid-point of unit rainfall duration,  $t_R$ , to peak of unit hydrograph, in hours

1827 acres

D.A. = 2.86 square miles, L = 3.07 miles, LCA = 1.40 miles

PMP = 20.5 inches  $C_t = 2.0$

$C_p = 0.625$  from average 640  $C_p = 400$

$$t_p = C_t (L \cdot LCA)^{0.3} = 2.0 [(3.33)(1.32)]^{0.3} = 3.10 \text{ hours}$$

$$t_r = \frac{t_p}{5.5} = \frac{3.10}{5.5} = .56 \text{ hours (Use 1 hr. hydrograph)}$$

$$t_{PR} = t_p + 0.25(t_R - t_r) = 3.10 + .25(1 - .56) = 3.21 \text{ hrs.}$$

From HMR 33 - Figure 2, Deple - Area - Duration

$$\begin{array}{lcl} 6 \text{ hour } \% \text{ III} & = & , \quad 12 \text{ hour } \% = 133 \\ 24 \text{ hour } \% \text{ 172} & = & , \quad 48 \text{ hour } \% = 142 \end{array}$$

## PROJECT GRID

JOB	NANTICOK CREEK SITE 9E	SHEET NO.	1	CHECKED BY		DATE	
SUBJECT	HYDROLOGY & HYDRAULIC COMPUTATIONS			COMPUTED BY	RLW	DATE	2/6/79

PRINCIPLE SPILLWAY CAPACITY

WATER SURFACE AT AUXILIARY SPILLWAY CREST

$$q = AV \sqrt{\frac{2gH}{1 + K_e + K_b + K_{aL}}} = 7.06 \sqrt{\frac{2(32.2)(40.7)}{1 + .5 + (.45) + (.0165)(207.6)}} = 155.90 \text{ cfs}$$

WATER SURFACE AT DESIGN HIGH WATER

$$q = 7.06 \sqrt{\frac{2(32.2)(43.4)}{1 + .5 + .45 + .0165(207.6)}} = 160.98 \text{ cfs}$$

WATER SURFACE AT TOP OF DAM

$$q = 7.06 \sqrt{\frac{2(32.2)(45.8)}{1 + .5 + .45 + .0165(207.6)}} = 165.38 \text{ cfs}$$

EMERGENCY SPILLWAY CAPACITY

WATER SURFACE AT TOP OF DAM

$$q = CLH^{3/2} = 3.087(330.6)(5.1)^{3/2} = 11,754.2 \text{ cfs}$$

RESERVOIR DRAIN CAPACITY

WATER SURFACE AT PRINCIPLE SPILLWAY CREST

$$q = .78 \sqrt{\frac{2(32.2)(23.7)}{1 + .5 + 0 + .116(26)}} = 14.34 \text{ cfs}$$

DEPTH OF FLOW IN EMERGENCY SPILLWAY DURING P.M.F.

$$Q = CLH^{3/2} \Rightarrow H^{3/2} = \frac{Q}{CL} = \frac{4749}{(3.087)(318)} \Rightarrow H = 2.86'$$

$$Q = 4905 - 156 = 4749$$

$$L = 2[150 + 1.5(3)(2)] = 318$$

\*\*\*\*\*  
 HEC-1 VERSION DATED JAN 1973  
 UPDATED AUG 74  
 CHANGE NO. 01  
 \*\*\*\*\*

HAITICOCK CREEK WATERSHED PROJECT SITE NO 9)  
 PMF WITH RATIOS  
 DATE

JOB SPECIFICATION  
 HQ NHR NHIN IDAY IHR IMIN METRC IPLT IPRT NSTAN.  
 100 1 0 0 0 0 0 0 0  
 JOPER 5 NWT  
 5 0

MULTI-PLAN ANALYSES TO BE PERFORMED  
 NPLAN= 1 NRTIO= 2 LATIO= 1  
 RTIOS= 0.50 1.00

\*\*\*\*\*

SUB-AREA RUNOFF COMPUTATION  
 ISTAQ ICOMP IECON ITAPE JPLT JPRY INAME  
 1 0 0 0 0 0 0 0

HYDROGRAPH DATA  
 INYDQ IUHG TAREA SNAP TRSDA TRSPC RATIO ISNDW ISAME LOCAL  
 1 1 2.86 0. 2.86 0. 0. 0 0 0 0

PRECIP DATA  
 SPFE PMS R6 R12 R24 R48 R72 R96  
 0. 20.50 111.00 122.00 133.00 142.00 0. 0. 0.

TRSPC COMPUTED BY THE PROGRAM IS 0.750

LOSS DATA  
 STRKR DLTKR RTIOL ERAIN STRKS RTIOK STRTL CNSTL ALSMX RTIMP  
 0. 0. 1.00 0. 0. 1.00 1.00 0.10 0. 0.

UNIT HYDROGRAPH DATA  
 TP= 3.00 CP=0.63 NTA= 0

RECESSION DATA  
 STRTQ= 4.00 ORCSN= 4.00 RTIOR= 1.00  
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SHYDER CP AND TP ARE TC= 3.71 AND R= 2.44 INTERVALS

UNIT HYDROGRAPH 15 END-OF-PERIOD ORIGINATES, LAG= 2.98 HOURS, CP= 0.63 VOL= 1.00  
 62. 216. 357. 284. 188. 124. 82. 54. 36.  
 23. 15. 10. 7. 4.

END-OF-PERIOD FLOW  
 TIME RAIN EXCS COMP Q  
 1 0.01 0. 4.  
 2 0.01 0. 4.  
 3 0.01 0. 4.  
 4 0.01 0. 4.  
 5 0.01 0. 4.  
 6 0.01 0. 4.  
 7 0.02 0. 4.

9	0.02	4.
10	0.02	4.
11	0.02	4.
12	0.02	4.
13	0.12	4.
14	0.14	4.
15	0.17	4.
16	0.44	5.
17	0.16	12.
18	0.13	26.
19	0.01	40.
20	0.01	43.
21	0.01	36.
22	0.01	26.
23	0.01	18.
24	0.01	14.
25	0.11	11.
26	0.11	12.
27	0.11	15.
28	0.11	19.
29	0.11	22.
30	0.11	24.
31	0.23	35.
32	0.28	73.
33	0.28	134.
34	0.28	197.
35	0.28	246.
36	0.28	278.
37	1.71	387.
38	2.05	730.
39	2.56	1353.
40	6.49	2368.
41	2.39	3681.
42	1.83	4725.
43	0.17	4905.
44	0.17	4192.
45	0.17	3131.
46	0.17	2174.
47	0.17	1479.
48	0.17	1020.
49	0.	713.
50	0.	498.
51	0.	342.
52	0.	225.
53	0.	144.
54	0.	89.
55	0.	41.
56	0.	22.
57	0.	11.
58	0.	8.
59	0.	7.
60	0.	5.
61	0.	5.
62	0.	4.
63	0.	4.
64	0.	4.
65	0.	4.
66	0.	4.
67	0.	4.
68	0.	4.
69	0.	4.
70	0.	4.
71	0.	4.
72	0.	4.
73	0.	4.







[illegible]

140.	143.	150.	162.	178.	196.	218.	258.	334.	487.
403.	423.	428.	419.	403.	387.	376.	368.	363.	359.
356.	354.	353.	350.	343.	333.	323.	313.	303.	294.
285.	276.	268.	261.	253.	246.	240.	234.	228.	223.
217.	212.	208.	203.	199.	195.	192.	188.	185.	182.
179.	176.	173.	171.	168.	166.	164.	162.	160.	158.
156.	155.	153.	152.	150.	149.	148.	147.	145.	144.

CFS	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
INCHES	4917.	3819.	1304.	463.	33468.	
AC-FT		12.42	16.96	18.07	18.14	
		1895.	2587.	2757.	2767.	

\*\*\*\*\*

\*\*\*\*\*

\*\*\*\*\*

\*\*\*\*\*

\*\*\*\*\*

# PEAK FLOW SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS

## RATIOS APPLIED TO FLOWS

OPERATION	STATION	PLAN	0.50	1.00
HYDROGRAPH AT	1	1	2452.	4905.
		2	0.	0.
ROUTED TO	1	1	2527.	4917.
		2	0.	0.

APPENDIX E  
STABILITY ANALYSES

2 -- W. S. Atkinson -- 5/25/65

Rey S. Decker

Subj: ENG 22-5, New York WP-08, Nanticoke Creek, Site No. 9-E  
(Broome County)

#### EMBANKMENT

- A. Classification: Embankment samples are classified GM and GC based on the gradation that includes 20% plus 3-in. material. Actually, the laboratory samples, 65W2924 and 65W2925, contained slightly over 50% fines.
- B. Density: Standard moisture-density tests were made in the minus 3/4-in. fraction. Maximum density ranges from 124.5 to 126.5 p.c.f.
- C. Shear Strength: Sample No. 65W2925 was tested, using the minus 3/4-in. fraction. One hundred percent of standard density was selected because previously tested similar material had relatively low shear strength at lower densities.

Shear values from this CU test are  $\phi = 31^\circ$ ,  $c = 500$  p.s.f. Effective stress parameters are  $\bar{\phi} = 32.5^\circ$ ,  $\bar{c} = 550$  p.s.f., correcting for measured pore pressure.

#### SLOPE STABILITY ANALYSIS

An embankment only analysis using laboratory charts based on a modification of the Swedish circle method and using shear values of  $\phi = 31^\circ$ ,  $c = 500$  p.s.f. indicates that the factor of safety of a 3:1 upstream slope and 2 1/2:1 downstream slope is in the range of 2.0. Drawdown to the base is assumed and the phreatic surface is assumed to emerge on the downstream slope.

It is concluded that more detailed analysis is not justified.

#### CONCLUSIONS AND RECOMMENDATIONS

- A. Site Preparation: It is recommended that the soft surface silts be removed. Most of this soil will be taken out in normal stripping operations.
- B. Centerline Cutoff: Cutoff of disturbed surface soil is recommended for the abutments. Cutoff of the alluvial gravels into till is recommended for the floodplain area. A 25-foot bottom width is recommended for this cutoff to reduce the exit gradient into the alluvial gravels. The GC material is satisfactory for backfill.
- C. Principal Spillway: No particular problems are anticipated.
- D. Drainage: With the proposed cutoff, the alluvial gravels downstream are expected to function as a drain. You may wish to consider a pick-up trench drain or a small rock toe to outlet this natural drain.



3 -- W. S. Atkinson - 5/25/65

Rey S. Decker

Subj: ENG 22-5, New York WP-08, Nanticoke Creek, Site No. 9-E  
(Broome County)

E. Embankment Design:

1. Selection of Material. Material like sample Nos. 65W2924 and 65W2925, GC and GM, can be used anywhere in the embankment. It is suggested that consideration be given to placing the coarser gravel with low-plastic fines, 65W2926 - GM, in the downstream base section provided it is practical to separate it from the other soils. Permeability of this material is expected to be somewhat higher than that of the others.

The recommended density control is 100% of standard based on the minus 3/4-in. fraction. Shear strength at this density is ample based on the test for Sample No. 65W2925. Notify us if you prefer a lower control than 100% of standard and another shear test and slope stability analysis will be made.

2. Slopes. Proposed 3:1 upstream and 2 1/2:1 downstream slopes are adequate.
3. Settlement Allowance. An allowance of 1.0 ft. is suggested to compensate for residual settlement in embankment and foundation; 0.8 ft., 2% average, for the embankment and 0.2 ft. for the foundation.

Prepared by:

\_\_\_\_\_  
Robert E. Nelson

Reviewed and Approved by:

\_\_\_\_\_  
Roland B. Phillips

Attachments

cc: B. S. Ellis, Syracuse, New York  
Henry W. Davis, Penn Yan, New York  
R. J. McClimans, Binghamton, New York  
H. M. Kautz, Upper Darby, Pennsylvania

## SUMMARY - SLOPE STABILITY ANALYSIS

State NEW YORK Project NANTICUM CREEK - SITE #9-E  
Date 5-18-65 Analysis Made By G.L.M. Checked By A.W.L.  
Method of Analysis SWEDISH CIRCLE

Location of Material											
Sample No.											
$\gamma_d$											
$\gamma_m$											
$\gamma_s$											
$\gamma_b$											
Condition	Opt.	Sat.	Opt.	Sat.	Opt.	Sat.	Opt.	Sat.	Opt.	Sat.	
$\phi$											
$\tan \phi$											
K											
C											

UPSTREAM SLOPE			
Trial	Slope	Conditions	Fs
1	3:1	Full drawdown - No berm - Arc cut from opp. shldr thru emb (31°-52.2) only - Sat shear values only	2.3

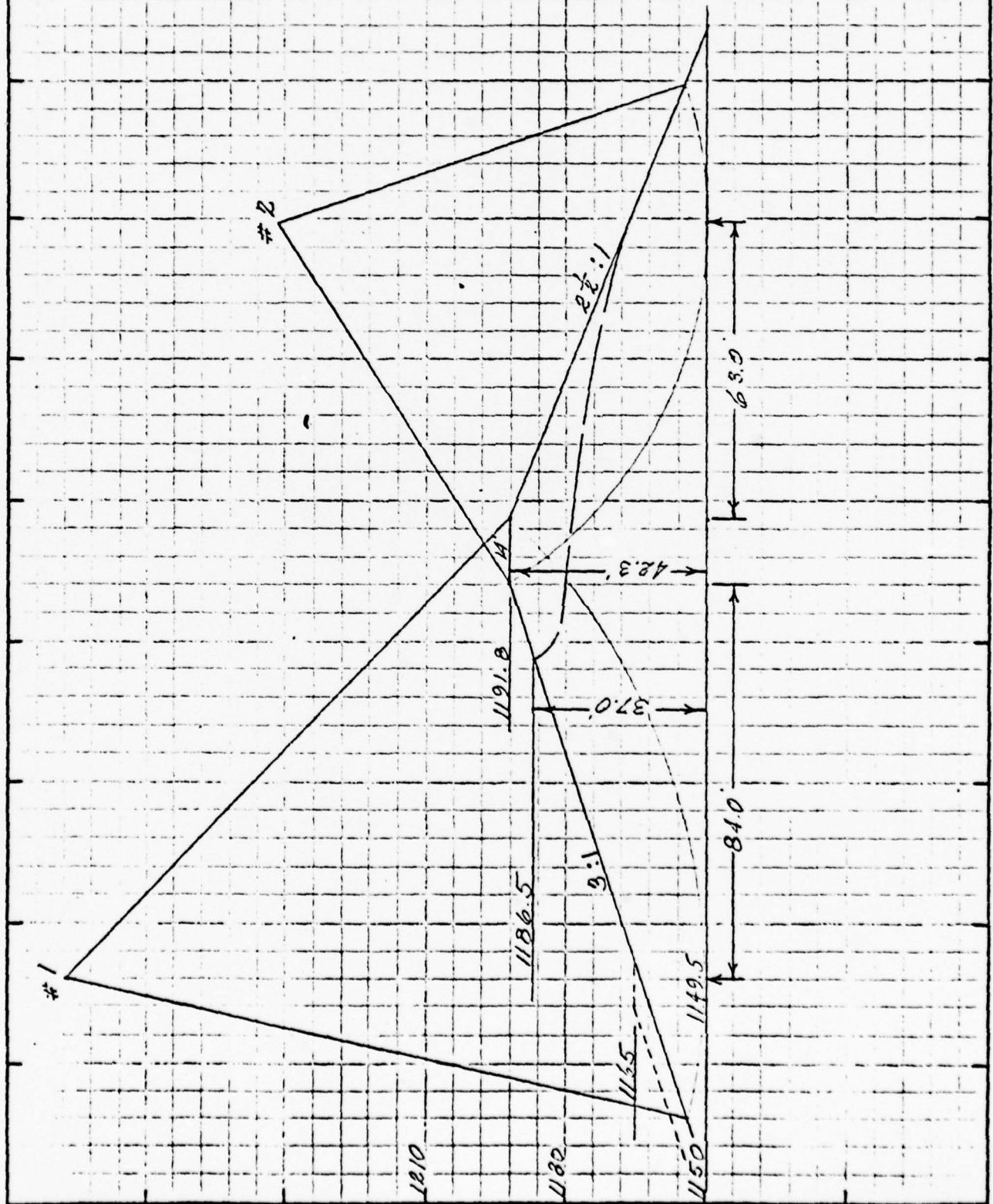
DOWNSTREAM SLOPE			
Trial	Slope	Conditions	Fs
2	2.5:1	No drain - No berm - Arc cut from opp. shldr thru emb (31°-52.2) only - Sat shear values only	2.2

Sheet 2 of 2

(SCS-357)

Supplement to sheet 1 of 2  
Nanticoke Creek - Site #9-E  
New York

Maximum Section  
Sta. 3+30



Scale 1 inch = 20 feet

APPENDIX F

REFERENCES



## APPENDIX F

### REFERENCES

- 1) U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, May 1961.
- 2) H.W. King and E.F. Brater, Handbook of Hydraulics, 5th edition, McGraw-Hill, 1963.
- 3) University of the State of New York, Geology of New York, Education Leaflet 20, Reprinted 1973.
- 4) Elwyn E. Seelye, Design, 3rd edition, John Wiley and Sons, Inc., 1960



APPENDIX G

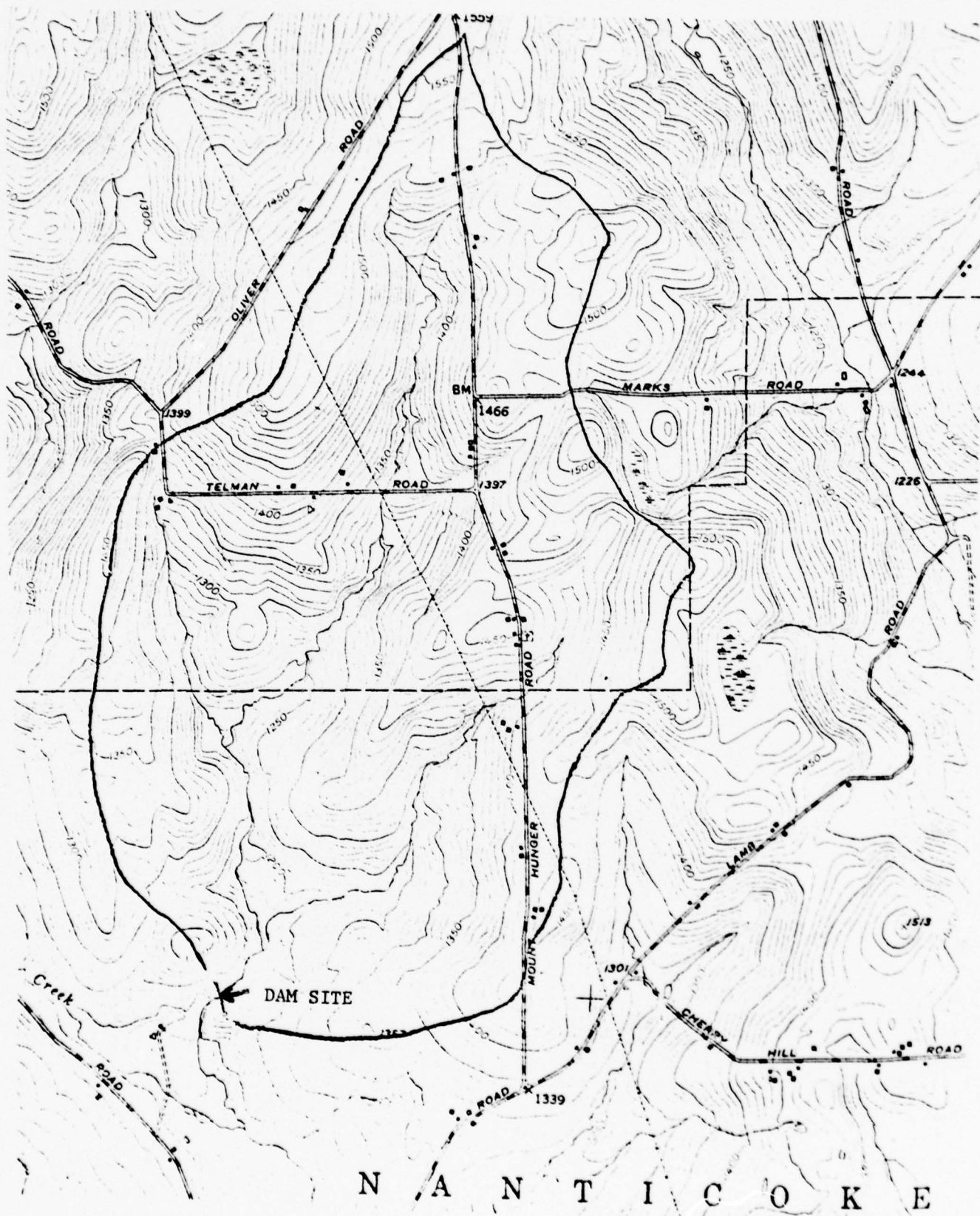
DRAWINGS

DAM SITE



VICINITY MAP

NANTICOKE CREEK WATERSHED PROTECTION PROJECT  
DAM SITE No. 9E



TOPOGRAPHIC MAP  
 NANTICOKE CREEK WATERSHED PROTECTION PROJECT  
 DAM SITE No. 9E

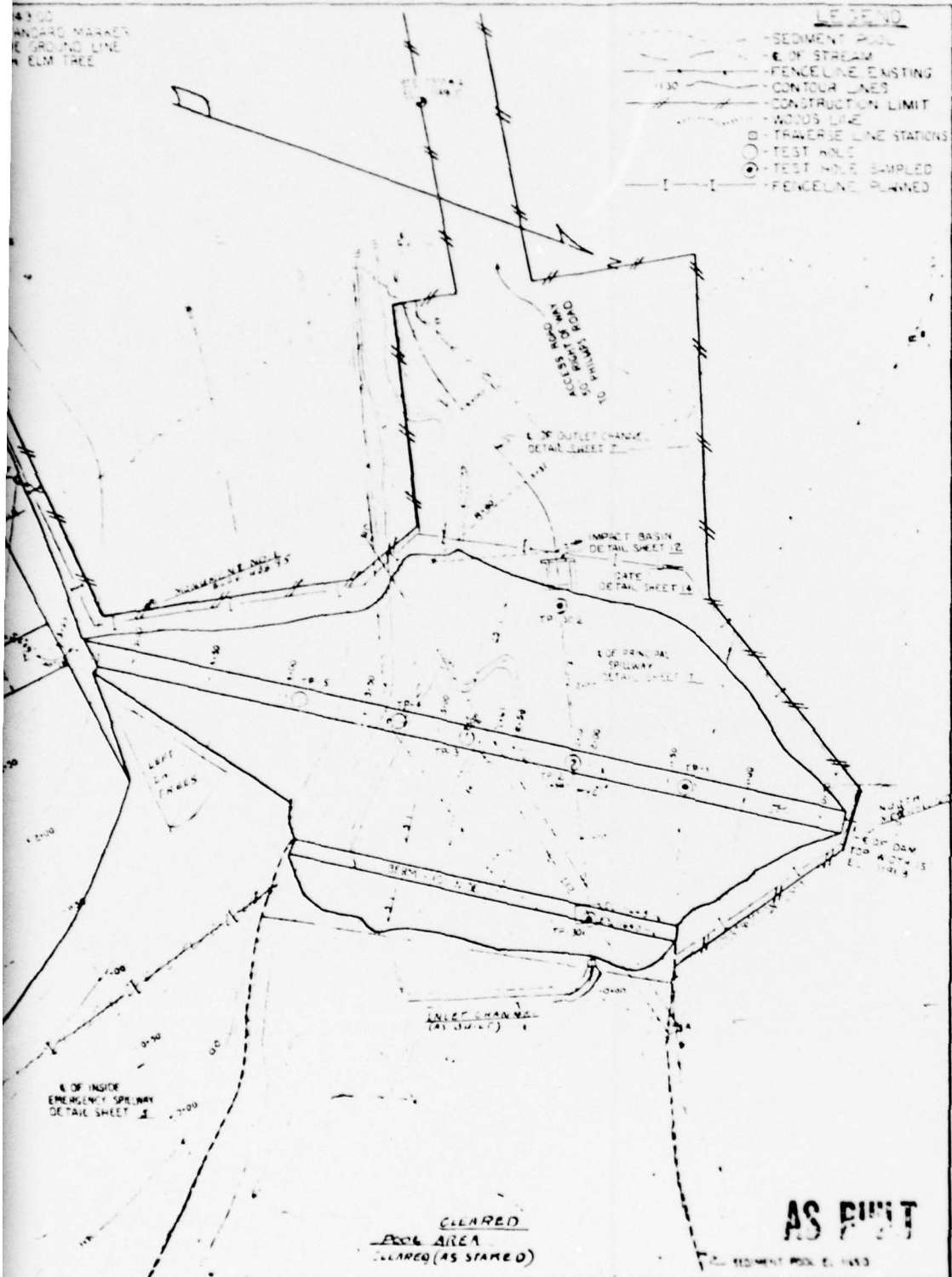
REFLECTION	DIST FROM P.C.
7° 46'	44.87
15° 32'	68.91
23° 8'	91.32
31° 02'	111.24



4300  
 STANDARD MARKER  
 E. GROUND LINE  
 N. ELM TREE

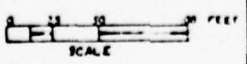
**LEGEND**

- SEDIMENT POOL
- E. OF STREAM
- FENCELINE EXISTING
- CONTOUR LINES
- CONSTRUCTION LIMIT
- WOODS LINE
- TRAVERSE LINE STATIONS
- TEST HOLE
- TEST HOLE SAMPLED
- FENCELINE PLANNED



**AS SHOWN**

**CLEARED  
 POOL AREA  
 CLEARED (AS SHOWN)**



**NANTICOKE CREEK WATERSHED PROJECT  
 SITE 9-E  
 FLOODWATER RETARDING DAM  
 BROOME COUNTY, NEW YORK  
 DAMSITE**

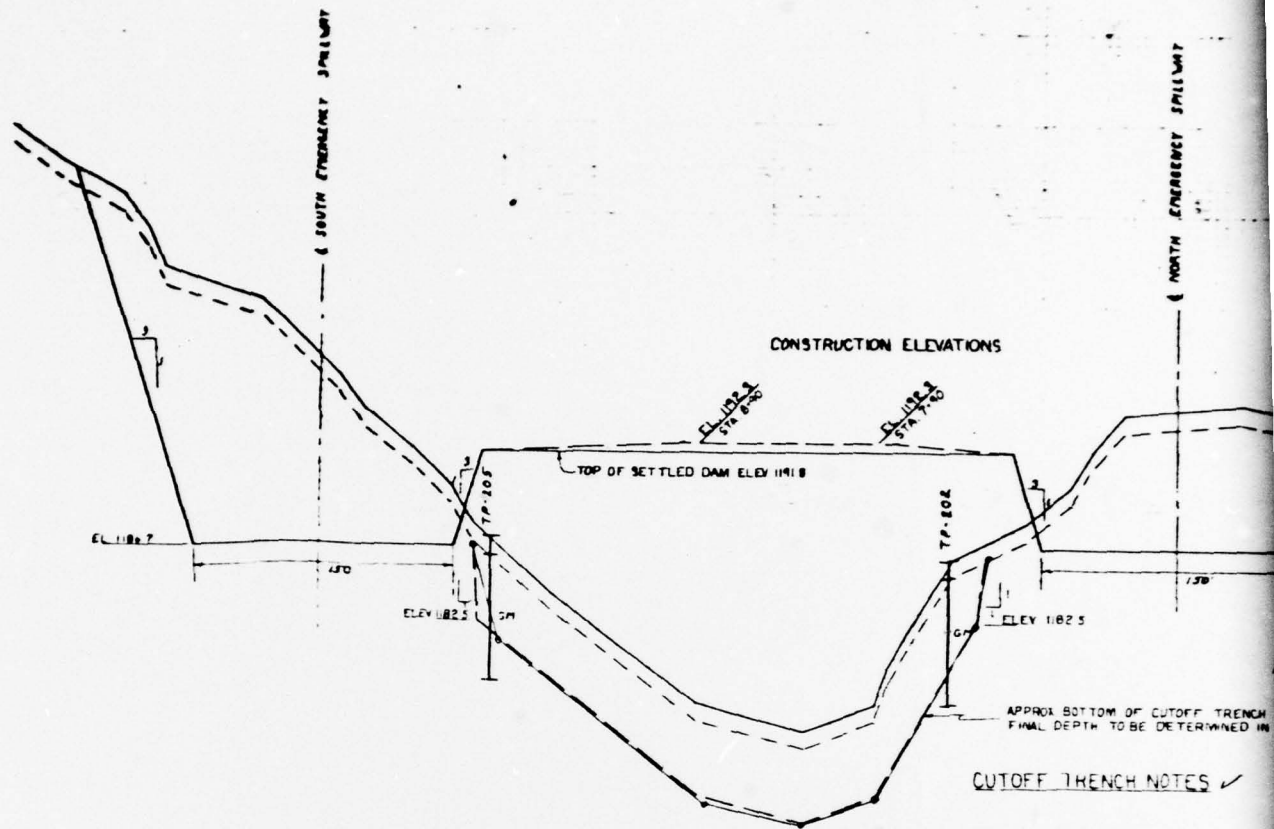
**U. S. DEPARTMENT OF AGRICULTURE  
 SOIL CONSERVATION SERVICE**

LC IBBITSON	1/65
W. YOLTON	1/65
W. YOLTON, D. ANGELO	1/65
L. B.	6/65

NY-2009-P

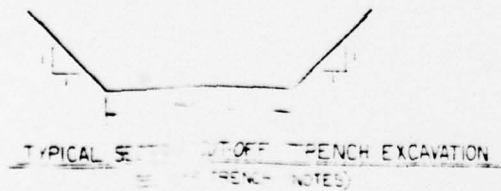
2



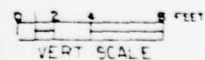
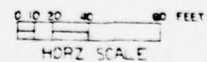


#### CUTOFF TRENCH NOTES ✓

1. BOTTOM WIDTH VARIES AS FOLLOWS  
 STA 0+55 (APPROX) TO STA 1+25 - E  
 STA 1+25 TO 1+55 - TRANSITION  
 STA 1+55 TO 3+25 - BOTTOM WIDTH  
 STA 3+25 TO 3+55 - TRANSITION  
 STA 3+55 TO 4+95 - BOTTOM WIDTH  
 STA 4+95 TO 7+35 - BOTTOM WIDTH  
 STA 7+35 TO 10+12 - BOTTOM WIDTH
2. DEPTH OF CUTOFF TRENCH BELOW  
 a. DAM BETWEEN THE TWO EMER  
 OF THE MAIN DAM ABOVE ELEV 1  
 b. THE ABUTMENTS OF THE MAIN  
 c. DEPTH OF CUTOFF TRENCH IN  
 THE BOTTOM OF THE GP-GM IN  
 20 TO 30 FEET
3. CUTOFF TRENCH TO BE BACKFILLED  
 FROM 10 TO 50 FEET AND TP 203 FR



#### PROFILE ALONG C OF DAM (LOOKING DOWNSTREAM)



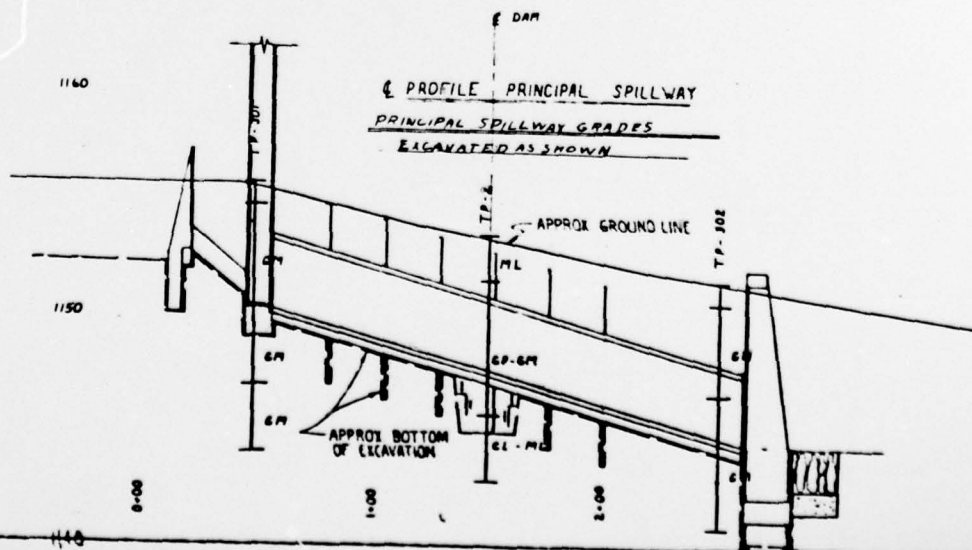
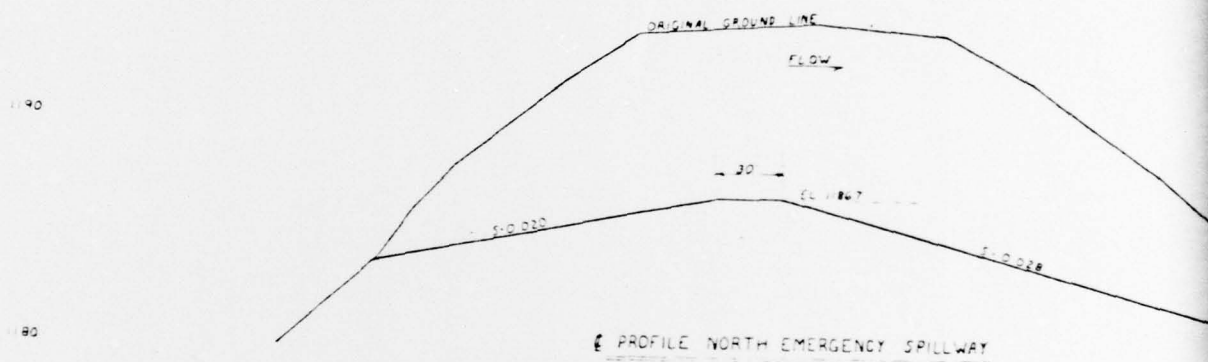
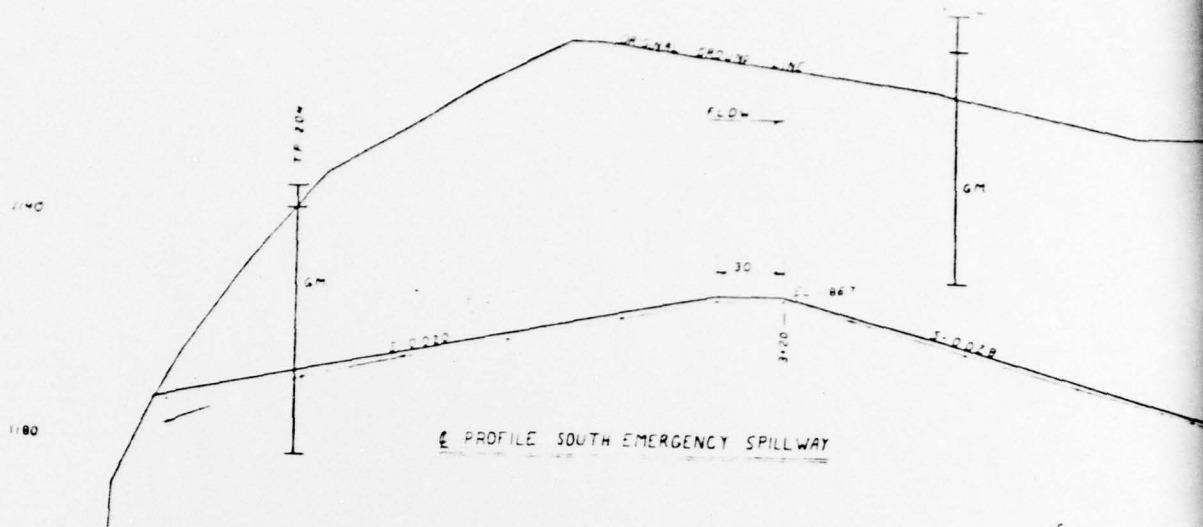
9+00

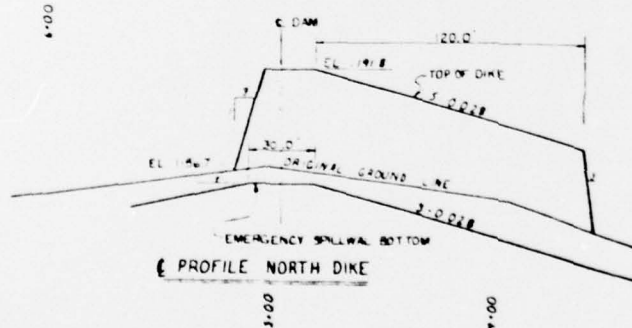
8+00

7+00

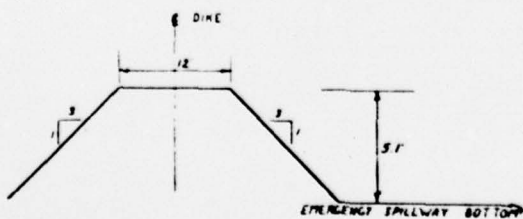
6+00





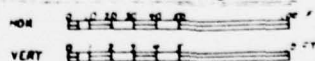


**AS BUILT**



TYPICAL DIKE SECTION

SCALE FOR ALL PROFILES ON THIS SHEET



NANTICOKE CREEK WATERSHED PROJECT  
SITE 9-E  
FLOODWATER RETARDING DAM  
BROOME COUNTY, NEW YORK  
PROFILES

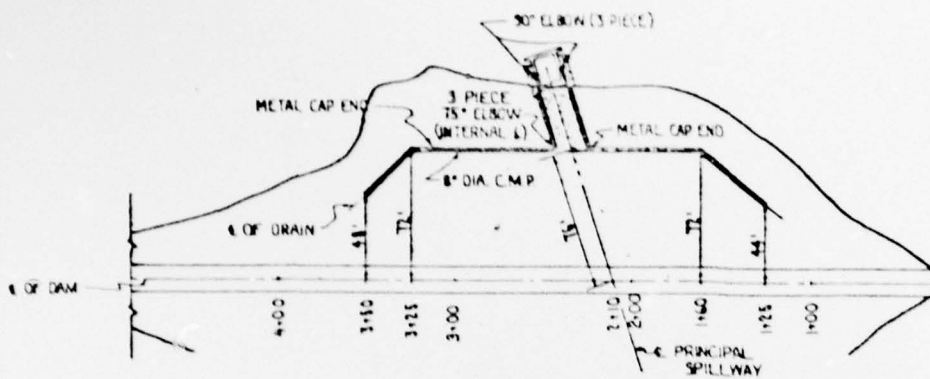
U.S. DEPARTMENT OF AGRICULTURE  
NATIONAL SERVICE

L. C. HOBSON 5/85

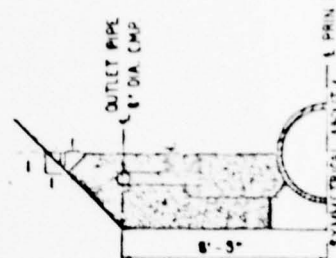
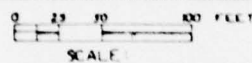
J. HUBB 5/85

L. B. 6/85 3 15 NY-2009-P





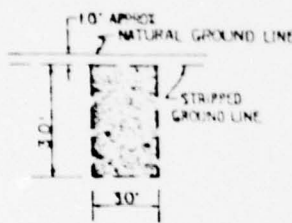
PLAN VIEW OF DRAINAGE SYSTEM



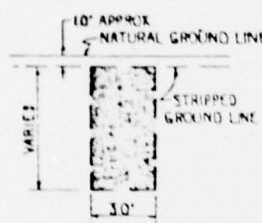
SECTION A-A



METAL CAP END



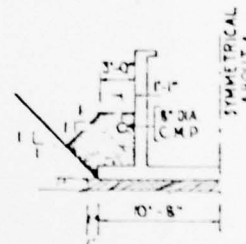
SECTION C-C



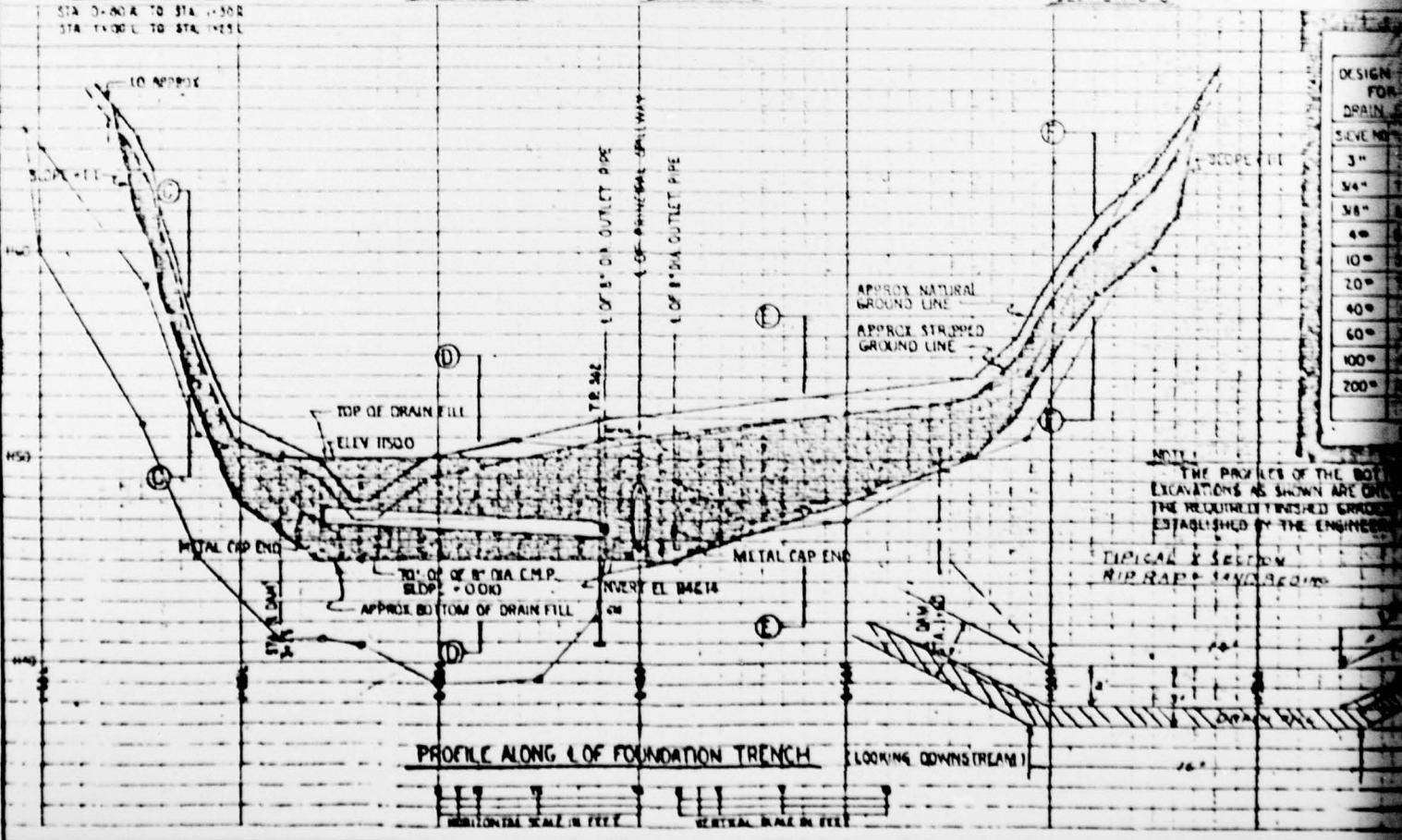
SECTION E-E



SECTION D-D



SECTION B-B



PROFILE ALONG L OF FOUNDATION TRENCH

LOOKING DOWNSTREAM

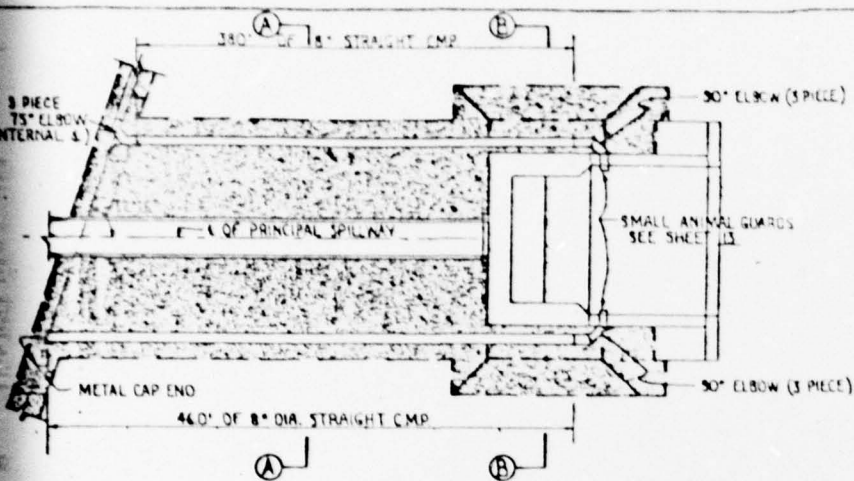
DESIGN FOR DRAIN
SEVE NO
3"
3/4"
3/8"
4"
10"
20"
40"
60"
100"
200"

NOTE: THE PROFILES OF THE BOTTOM EXCAVATIONS AS SHOWN ARE ON THE RECONSTRUCTED FINISHED GROUND ESTABLISHED BY THE ENGINEER.

TYPICAL X SECTION

RIP RAP 14\"/>





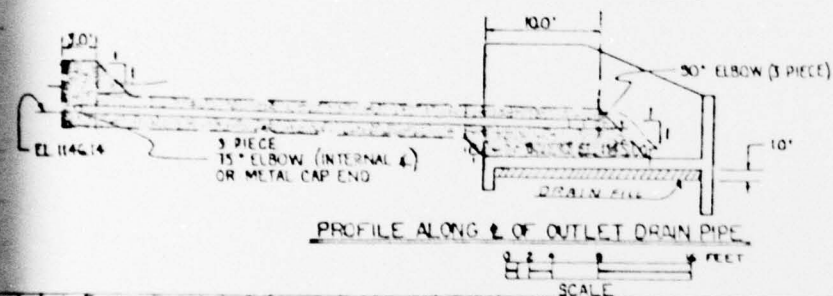
# QUANTITY SUMMARY

- 201 - CU YDS OF DRAIN FILL
- 154 - FEET OF 8" DIA. CMP
- 2 - 90° ELBOWS, 3 PIECE
- 1 - 75° ELBOW, INTERNAL &
- 2 - METAL CAP ENDS

## NOTE

ALL DRAIN PIPE SHALL CONFORM TO MATERIAL SPEC NO 4 SHALL BE SHAW-WALSH CLASS II, TYPE A, PERFORATED PIPE. ALL PIPE SHALL BE LAID WITH PERFORATIONS DOWN.

## PLAN OF OUTLET DRAIN

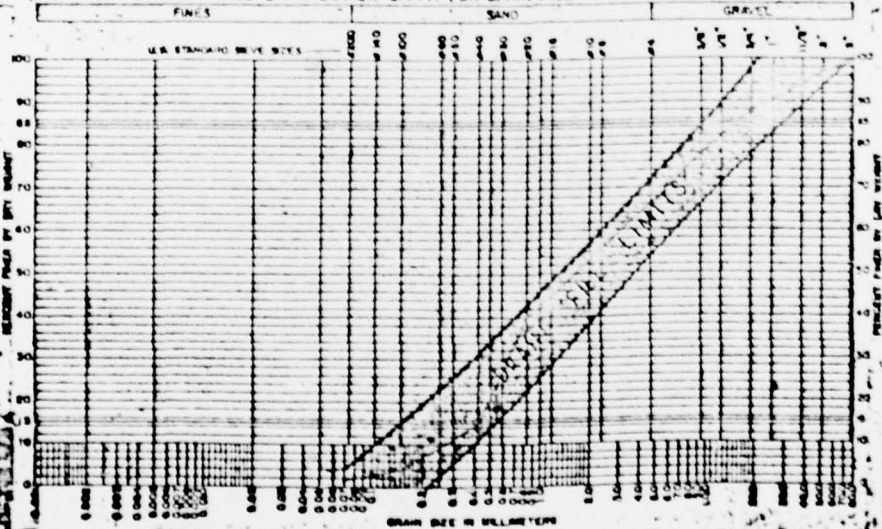


AS BUILT

## DESIGN DATA FOR DRAIN FILL

SEIVE NO. PASSING	PERCENT PASSING
3"	100
3/4"	78 - 98
3/8"	66 - 85
4"	54 - 72
10"	38 - 57
20"	22 - 43
40"	11 - 31
60"	2 - 23
100"	0 - 15
200"	0 - 5

## GRAIN SIZE DISTRIBUTION GRAPH FOR DRAIN FILL



ALL GRADES OF THE BOTTOM OF ALL ARE SHOWN ARE ONLY APPROXIMATE. FINISHED GRADES WILL BE DETERMINED BY THE ENGINEER.

NORTHMOORE CREEK WATERFED PROJECT  
SITE 9-E  
FLOODWATER RETARDING DAM  
BROOME COUNTY, NEW YORK  
DRAINAGE SYSTEM DETAILS  
U.S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed by L. C. BRITTON	Date 5/83	Drawn by B. ANGELD W. YOLTON	Date 5/83
Checked by 2.41	Scale 1" = 10'	Drawn by NY-2009-P	

		PIPE DIP AS BUILT
		1/4"
20	49.98	3/16"
40	49.46	3/16"
60	48.94	1/8"
80	48.42	1/4"
100	47.90	1/4"
120	47.38	1/4"
140	6.62	1/8"
160	5.98	3/16"
180	5.34	1/4"
200	5.15	1/4"
OUTLET 204.33	1144.51	

#### NOTE

1. ALL ELEVATIONS ARE IN FEET AND DECIMALS THEREOF.

STATION	ELEV. AS BUILT
1	47.1
2	46.5
3	45.0
4	44.9
5	44.4

COLLAR BOTTOM ELEV.  
AS BUILT

STATION	ELEV. AS BUILT
1	47.1
2	46.5
3	45.0
4	44.9
5	44.4

OUTLET 204.33

1. ALL ELEVATIONS ARE IN FEET AND DECIMALS THEREOF.



#### PROFILE ALONG C OF PRINCIPAL SPILLWAY



STA. 0+44 TO STA. 0+85 B=10.0  
STA. 0+85 TO STA. 1+25 TRANSITION  
STA. 1+25 TO STA. 2+56 B=17.5  
STA. 2+56 TO STA. 2+81 TRANSITION  
STA. 2+81 TO STA. 2+81 B=21.5

TYPICAL SECTION-INLET CHANNEL

TYPICAL SECTION-POND DRAIN EXCAVATION

TYPICAL SECTION-PRINCIPAL SPILLWAY EXCAVATION

POND DRAIN PIPE TO BE PLACED ON 2 TO 3 INCHES OF COMPRESSIBLE SOIL FREE FROM LUMPS. THIS MATERIAL NEED NOT BE COMPACTED BEFORE PLACING THE PIPE BUT MUST BE GRADED TO A TRUE PLANE.



NOTE  
 (10) 20'-  
 THE SUPPLIER'S NOTE  
 CAST OUTSIDE OF SPOT JOINTS  
 WITH CONCRETE OF 20' OF SECTION

SPILLWAY  
 SCALE

**AS BUILT**

USE THIS SHEET FOR PIPE CONDUITS  
 FURNISHED IN 20' SECTIONS

1. B. 10.0  
 2. TRANSITION  
 3. B. 17.5  
 4. TRANSITION  
 5. B. 21.5

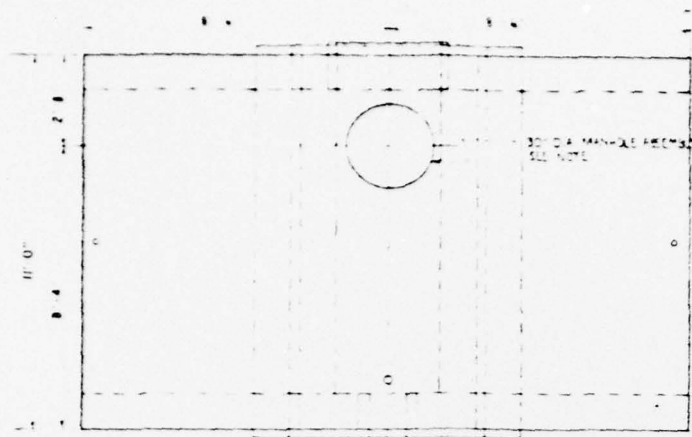


OUTLET EXCAVATION      TYPICAL SECTION - OUTLET CHANNEL

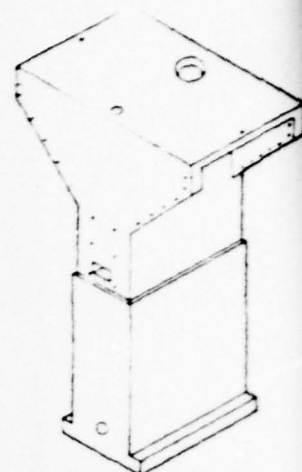
**NANTICOKE CREEK WATERSHED PROJECT**  
**SITE 9-E**  
**FLOODWATER RETARDING DAM**  
**BROOME COUNTY, NEW YORK**  
**PLAN - PROFILE OF PRINCIPAL SPILLWAY**  
**U.S. DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

L. C. ROBINSON	5/63
J. W. R.	5/63
L. B.	6/63

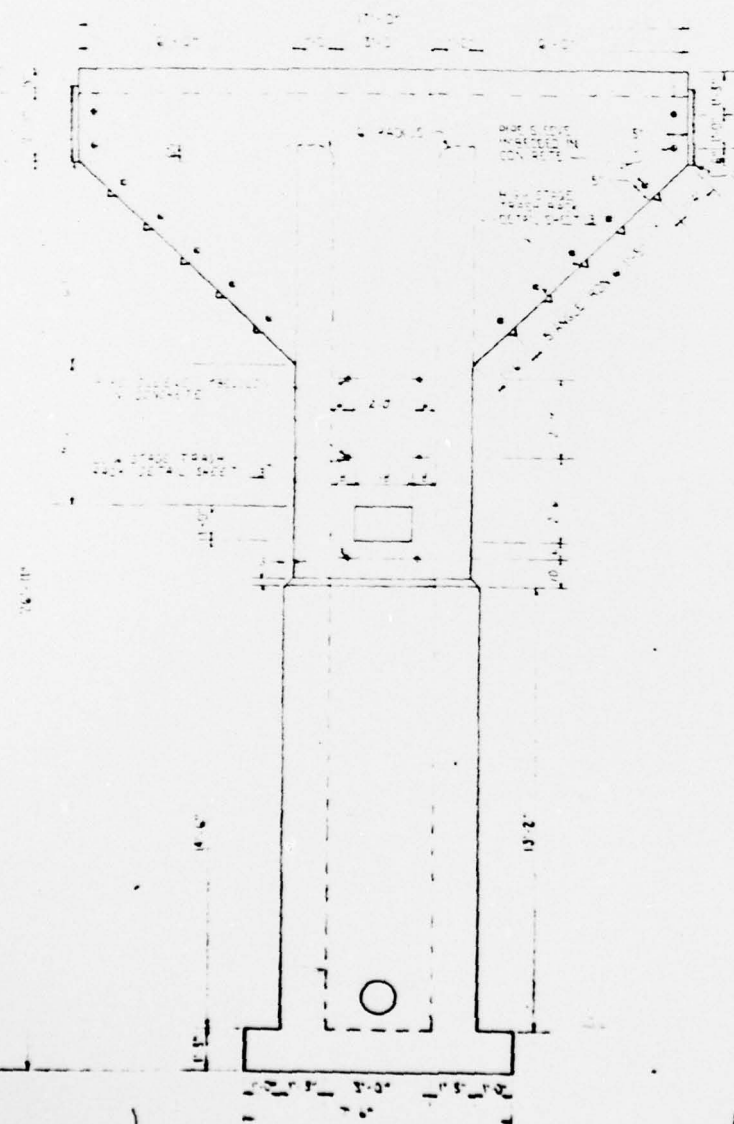
NY-2000-P



PLANVIEW



ISOMETRIC OF RISER  
NOT TO SCALE



UPSTREAM ELEVATION



MODIFICATION #1

SECTION ABOUT INTERIOR

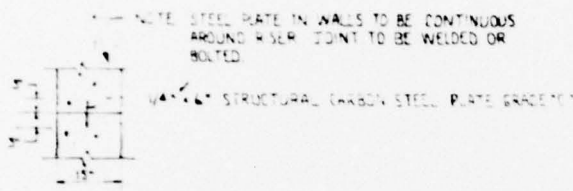
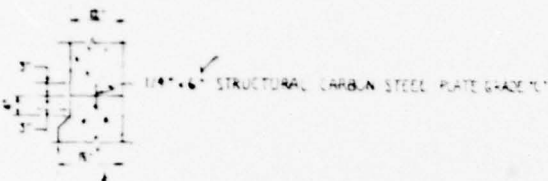


MANHOLE REVISION NOTES

- ✓ 1. 30" DIA. MANHOLE WITH UNDERSIDE HOOPS AND 4" DIA. MIN. ROUND HOLE LIFTING DEVICE
2. PAINT IN ACCORDANCE WITH CONST. SPEC. 2.2

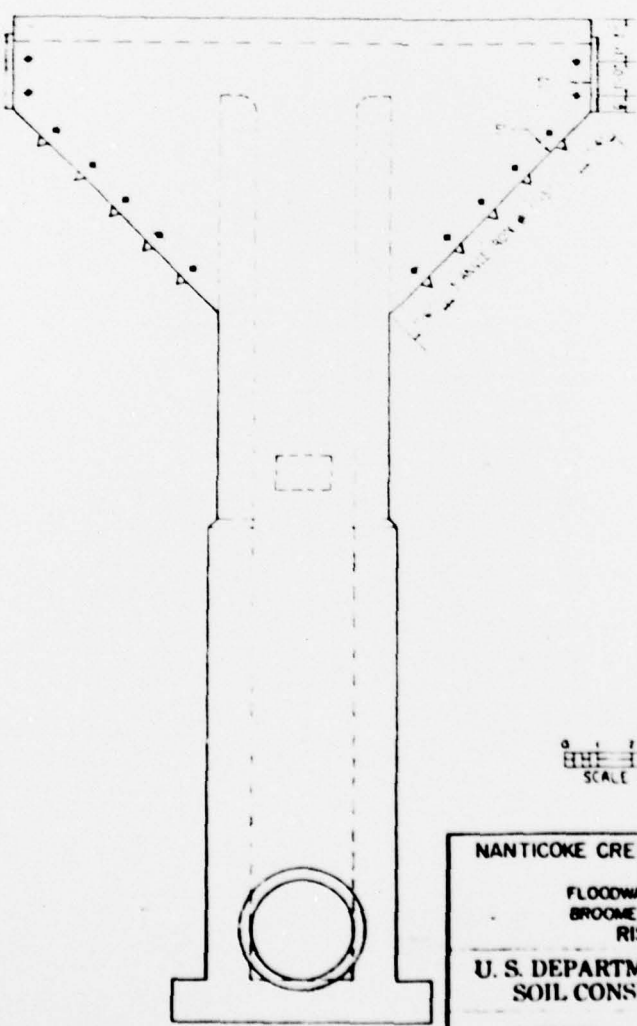
SLIDE GATE NOTES

1. 2' DIA. FLAT FRAME SLIDE GATE
  2. WEDGES AND WEDGE SEATS SHALL BE 1/4" INCH
  3. SEATING HEAD 1' 0"
  4. OPERATING HEAD 2' 0"
  5. UNSEATING HEAD 2' 0"
  6. 1" TYPE WALL THIMBLE 1/2" DEEP WELDED TO 2" DIA. STUB OF 1" DIA. GAGE PIPE
  7. RISING STEM, THREADED PORTION BRONZE
  8. STEM, STEM GUIDES AND LIFTING DEVICE TO BE AND SPACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS
  9. PAINT IN ACCORDANCE WITH CONST. SPEC. 2.2
- INSTALLED - RISING STEM  
MODEL 105



NOTE: STEEL PLATE IN WALLS TO BE CONTINUOUS AROUND RISER JOINT TO BE WELDED OR BOLTED.

PLATE CONST. JOINT DETAILS ✓



0 1 2 3 4 5  
SCALE IN FEET

**AS SHOWN**

NANTICOKE CREEK WATERSHED PROJECT  
SITE 9-E  
FLOODWATER RETARDING DAM  
BROOME COUNTY, NEW YORK  
RISER DETAILS

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

L. C. BISHOP

5/65

W. P. YOLTON

5/65

L. B.

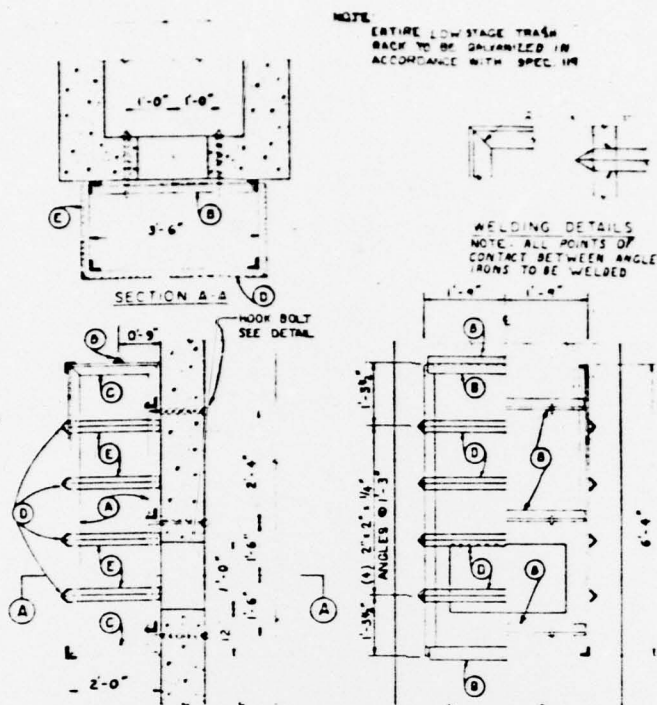
6/65

NY-2009-P

DOWNSTREAM ELEVATION

2





SECTION ON E

ELEVATION

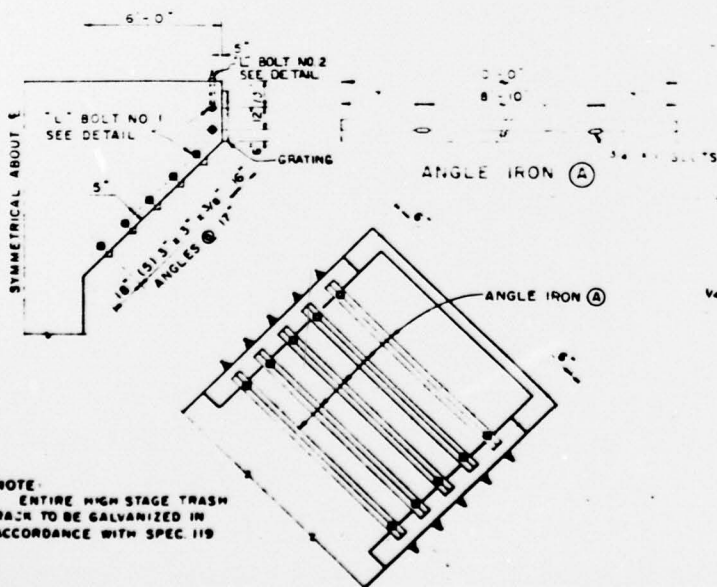
LOW STAGE TRASH RACK DETAILS ✓

3/4" DIA HOOK BOLT  
THREADED PORTION  
2 1/2" LONG

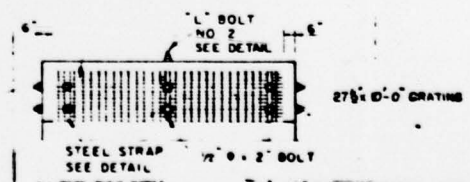


HOOK BOLT DETAIL

CALL FOR SUPPLY W/NOTE & WASHERS

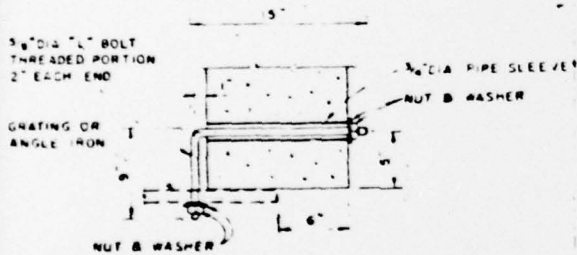


HIGH STAGE TRASH RACK DETAILS ✓

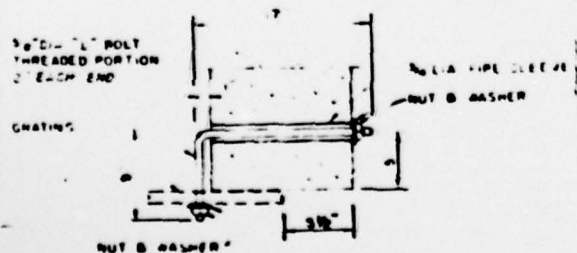


BILL OF MATERIAL				
LOCATION	ITEM	SIZE	LENGTH	QUANTITY
LOW STAGE TRASH RACK	① ANGLE IRON	2 1/2" x 2 1/2" x 1/4"	8'-0"	4
	ANGLE IRON	2 1/2" x 2 1/2" x 1/4"	3'-0"	4
	ANGLE IRON	2 1/2" x 2 1/2" x 1/4"	2'-0"	4
	ANGLE IRON	2 1/2" x 2 1/2" x 1/4"	2'-0"	4
	ANGLE IRON	2 1/2" x 2 1/2" x 1/4"	2'-0"	4
	HOOK BOLT 1/2" NUTS AND WASHERS	1/2" DIA	4'-0"	4
	PIPE SLEEVE	1/2" DIA	4'-0"	4
HIGH STAGE TRASH RACK	② ANGLE IRON	3" x 3" x 1/4"	40'-0"	4
	L BOLT 1/2" NUTS AND WASHERS	1/2" DIA	40'-0"	20
	L BOLT 1/2" NUTS AND WASHERS	1/2" DIA	9'-0"	2
	REG ANGLE BOLT 1/2" NUTS AND WASHERS	1/2" DIA	0'-0"	2
	PIPE SLEEVE	1/2" DIA	1'-0"	20
	PIPE SLEEVE	1/2" DIA	0'-0"	2
	STEEL STRAP CRATING	2" x 4" x 1/4"	2'-0"	2

1/2" DIA PIPE SLEEVE  
NUT & WASHER

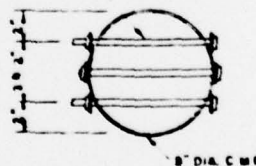


**BOLT DETAIL N° 1** ✓  
GALV IRON, SUPPLY 1/2\"/>



**BOLT DETAIL N° 2** ✓  
GALV IRON, SUPPLY 1/2\"/>

1/2" DIA GALV BOLTS  
1/2" NUTS & WASHERS  
5' LONG



**SMALL ANIMAL GUARD DETAILS** ✓

**AS BUILT**

NANTICOKE CREEK WATERSHED PROJECT  
SITE 9-E  
FLOODWATER RETARDING DAM  
BROOME COUNTY, NEW YORK  
TRASH RACKS AND MISC DETAILS

U. S. DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE

Designed by L. C. BRITSON	Date 3/65	Reviewed by T. C.
Drawn by L. C.	Date 4/65	Reviewed by T. C.
Project No. NY-2009-P		

2

TP 101, Elev. 117.2

- 0 1 Topsoil
- 1 8 Gravel, approx. 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense. D.S. 101.1
- 1 12 Clay, silty - approx. 10% + 200 - brown - moist to wet - very slowly permeable - Binghamton drift (glacial till) - very dense. D.S. 101.1
- 1 12 Silty - approx. 15% + 200, 15% + 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense. D.S. 101.1

TP 2, Elev. 115.1

- 0 2 Topsoil, silt and fine grained Recent alluvium - light brown - moist - slowly permeable - Recent - silt to silty clay.
- 1 8 Gravel, about 10% fines - subangular coarse fraction - brown - wet to saturated - moderately permeable - probably Recent alluvium - very loose. D.S. 2.1
- 1 11 Clay, silty - about 10% + 200 - grayish brown - wet - very slowly permeable - Recent till phase - very loose. D.S. 2.2

TP 3, Elev. 113.2

- 0 1 Topsoil
- 1 4 Gravel, well graded down to about 15% fines (GM) coarse fraction somewhat tabular and subangular - brown - wet to saturated at 3.5' - moderately permeable - probably Recent alluvium - mod. loose (seepage at 3.5').
- 4 9 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - gray - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 4, Elev. 110.0

- 0 2 Recent alluvium, stream gravel and clay matrix.
- 2 4 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - gray - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

NOTE: Gravel into brownish glacial till at 3.5'.

TP 5, Elev. 117.3

- 0 1.5 Topsoil
- 1.5 7 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 101, Elev. 120.4

- 0 1 Topsoil
- 1 11 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 102, Elev. 119.4

- 0 1.5 Topsoil
- 1.5 12 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 103, Elev. 117.2

- 0 1.5 Topsoil
- 1.5 12 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 201, Elev. Spill, Elev. 117.4

- 0 1 Topsoil
- 1 12 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 202, Elev. Spill, Elev. 117.6

- 0 1 Topsoil
- 1 8 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense. D.S. 202.1

TP 203, Elev. Spill, Elev. 117.7

- 0 1 Topsoil
- 1 12 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 204, Elev. Spill, Elev. 117.8

- 0 1 Topsoil
- 1 12 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 205, Elev. Spill, Elev. 117.9

- 0 1 Topsoil
- 1 12 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense. D.S. 205.1

TP 206, Elev. Spill, Elev. 118.4

- 0 1 Topsoil
- 1 12 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

TP 207, Elev. Spill, Elev. 118.6

- 0 1 Topsoil
- 1 11 Gravel, well graded, with approximately (GM) 20% + 3" and occasional 4" cobbles - about GM 40% fines - brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense (a somewhat pure silty sand zone was encountered at the 1' level - probably not extensive). D.S. 207.1

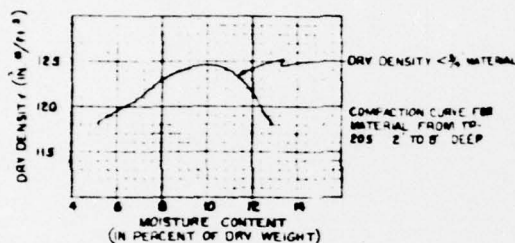
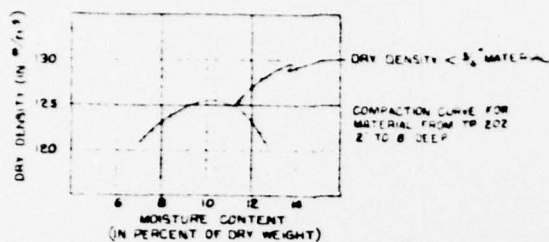
TP 208, Elev. Spill, Elev. 119.1

- 0 1 Topsoil
- 1 5.5 Gravel, well graded down to about 15% fines - coarse fraction somewhat tabular and subangular - brown - wet to sat. at 3.5' - moderately permeable - probably Recent alluvium - mod. loose (seepage at 3.5').
- 5.5 9.0 Gravel - well graded down to 20% fines - (GM) brown - dense (increasing density with depth) - mod. perm. - saturated (atony till).
- 9 12 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - grayish brown - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense. D.S. 208.1

TP 209, Elev. Spill, Elev. 119.4

- 0 1 Topsoil
- 1 5 Gravel, well graded down to about 15% fines - coarse fraction somewhat tabular and subangular - brown - wet to sat. at 3.5' - moderately permeable - probably Recent alluvium - mod. loose (seepage at 3.5'). D.S. 209.1
- 5 11 Gravel, approximately 20% + 3" and 40% fines (GM) fairly well graded - gray - moist to wet - slowly permeable - Binghamton drift (glacial till) - very dense.

# COMPACTION CURVES



## TEST HOLE NUMBERING SYSTEM

Centerline of hole	1-1
Bottom area	2-2
Centerline of hole	3-3
Centerline of hole	4-4
Centerline of hole	5-5
Centerline of hole	6-6
Centerline of hole	7-7
Centerline of hole	8-8
Centerline of hole	9-9
Centerline of hole	10-10
Centerline of hole	11-11
Centerline of hole	12-12
Centerline of hole	13-13
Centerline of hole	14-14
Centerline of hole	15-15
Centerline of hole	16-16
Centerline of hole	17-17
Centerline of hole	18-18
Centerline of hole	19-19
Centerline of hole	20-20
Centerline of hole	21-21
Centerline of hole	22-22
Centerline of hole	23-23
Centerline of hole	24-24
Centerline of hole	25-25
Centerline of hole	26-26
Centerline of hole	27-27
Centerline of hole	28-28
Centerline of hole	29-29
Centerline of hole	30-30
Centerline of hole	31-31
Centerline of hole	32-32
Centerline of hole	33-33
Centerline of hole	34-34
Centerline of hole	35-35
Centerline of hole	36-36
Centerline of hole	37-37
Centerline of hole	38-38
Centerline of hole	39-39
Centerline of hole	40-40
Centerline of hole	41-41
Centerline of hole	42-42
Centerline of hole	43-43
Centerline of hole	44-44
Centerline of hole	45-45
Centerline of hole	46-46
Centerline of hole	47-47
Centerline of hole	48-48
Centerline of hole	49-49
Centerline of hole	50-50
Centerline of hole	51-51
Centerline of hole	52-52
Centerline of hole	53-53
Centerline of hole	54-54
Centerline of hole	55-55
Centerline of hole	56-56
Centerline of hole	57-57
Centerline of hole	58-58
Centerline of hole	59-59
Centerline of hole	60-60
Centerline of hole	61-61
Centerline of hole	62-62
Centerline of hole	63-63
Centerline of hole	64-64
Centerline of hole	65-65
Centerline of hole	66-66
Centerline of hole	67-67
Centerline of hole	68-68
Centerline of hole	69-69
Centerline of hole	70-70
Centerline of hole	71-71
Centerline of hole	72-72
Centerline of hole	73-73
Centerline of hole	74-74
Centerline of hole	75-75
Centerline of hole	76-76
Centerline of hole	77-77
Centerline of hole	78-78
Centerline of hole	79-79
Centerline of hole	80-80
Centerline of hole	81-81
Centerline of hole	82-82
Centerline of hole	83-83
Centerline of hole	84-84
Centerline of hole	85-85
Centerline of hole	86-86
Centerline of hole	87-87
Centerline of hole	88-88
Centerline of hole	89-89
Centerline of hole	90-90
Centerline of hole	91-91
Centerline of hole	92-92
Centerline of hole	93-93
Centerline of hole	94-94
Centerline of hole	95-95
Centerline of hole	96-96
Centerline of hole	97-97
Centerline of hole	98-98
Centerline of hole	99-99
Centerline of hole	100-100

## UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

GM	Gravel, silty, gravel-sand-silt mixtures
ML	Silt; silty, v. fine sand; sandy or clayey silt
SM	Sand, silty
SW	Gravel, clean, well graded
CL	Clay - liquid limit of 20 or less
GP	Poorly graded gravel

## SAMPLE

By: [Signature]

All soil and rock descriptions and classifications were determined by visual examination.

(1 X) UNIFIED CLASSIFICATION MADE BY VISUAL INSPECTION IN FIELD  
 (X X) UNIFIED CLASSIFICATION BY LABORATORY

AS BUILT

NANTICOKE CREEK WATERSHED SITE-9E	
LOGS OF TEST HOLES	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
LOGGED By: [Signature] Date: 12/2/64	APPROVED BY [Signature] Date: 12/2/64
Drawn by: [Signature] Title: [Signature] Date: 12/2/64	Checked by: [Signature] Date: 12/2/64
Site: L. B.	643 15 NY-2009-6

2